TECHNOLOGY DEPT.

Gas Journal

VOL. 285. 108th YEAR. LONDON, JANUARY 11, 1956. No 4832. PRICE 1/6

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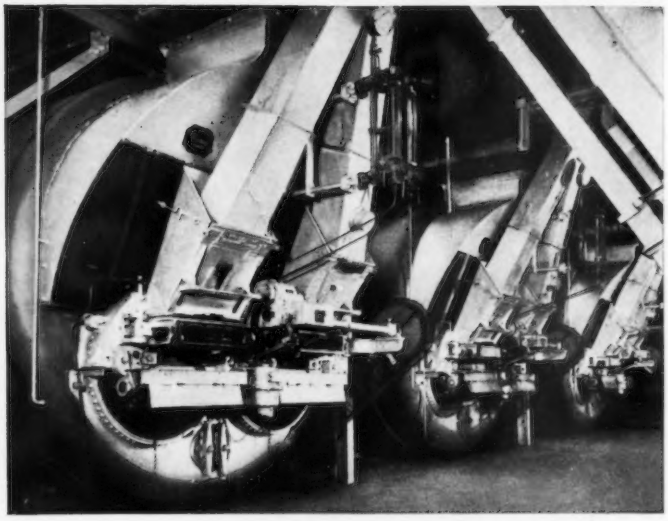

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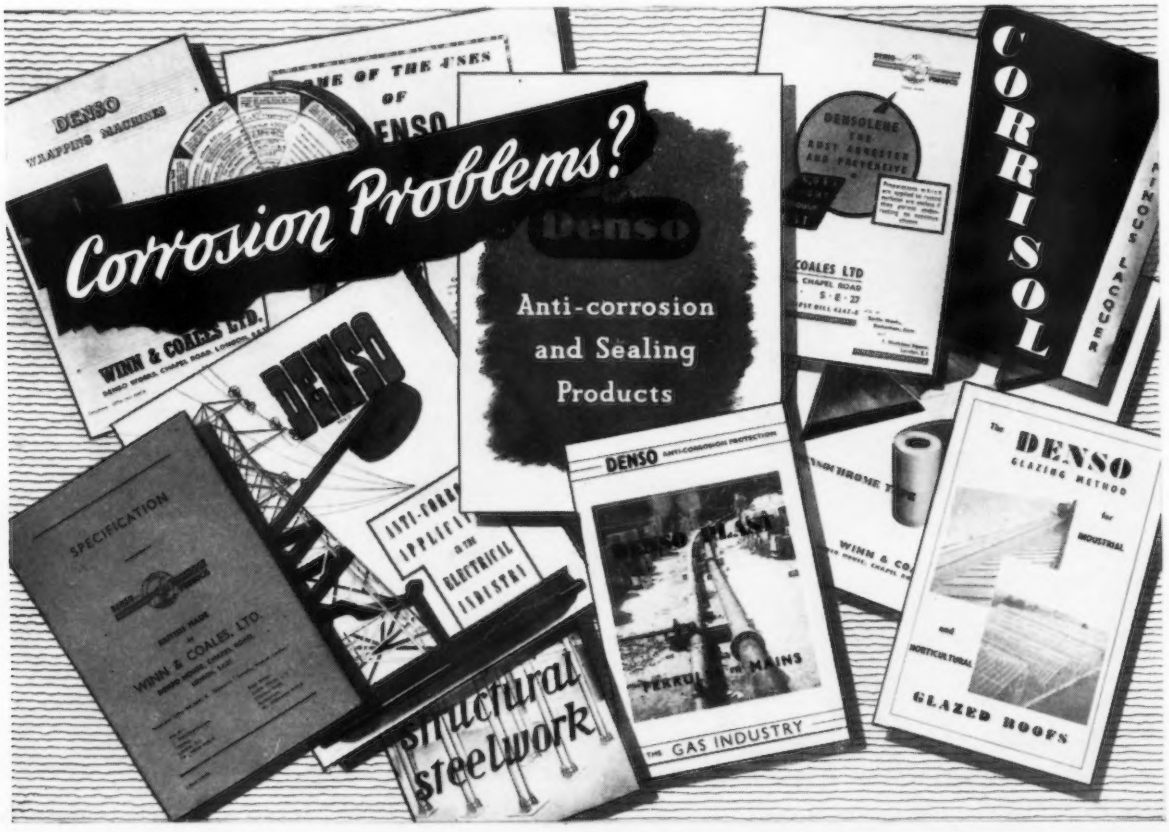

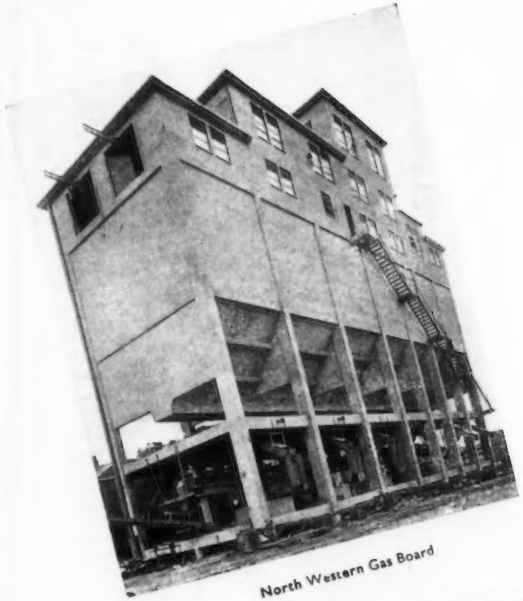

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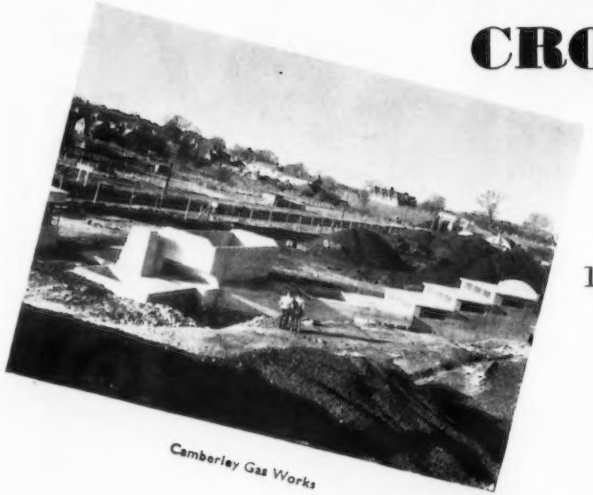

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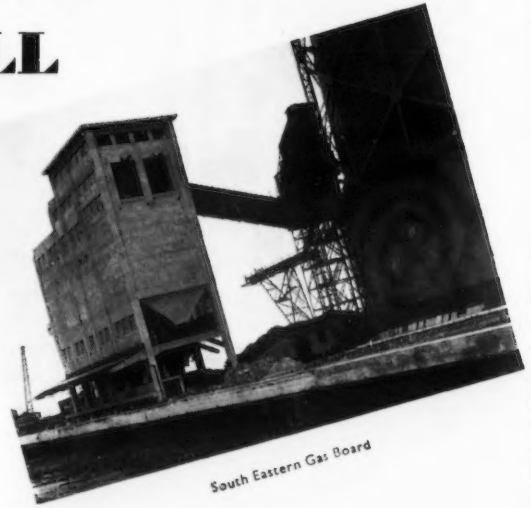

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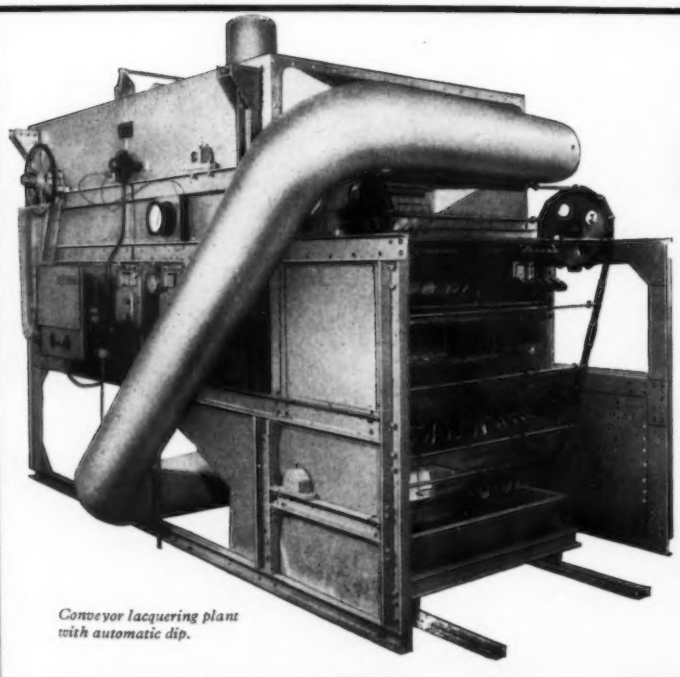

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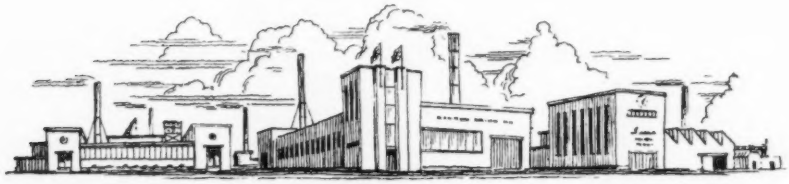

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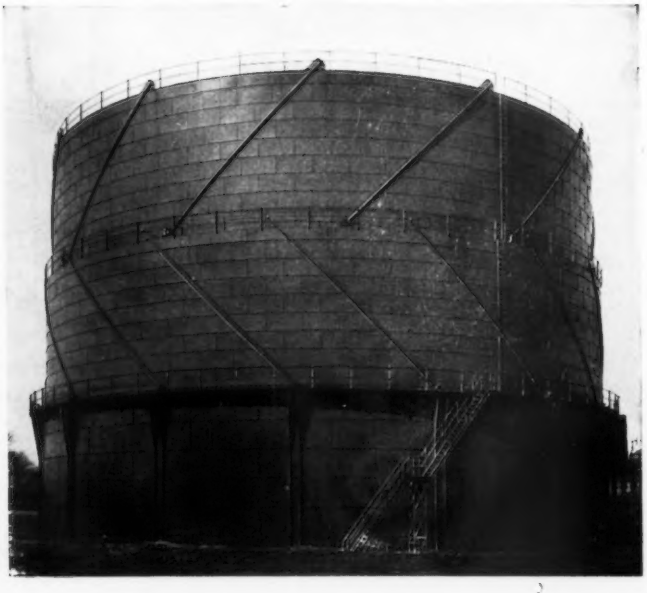

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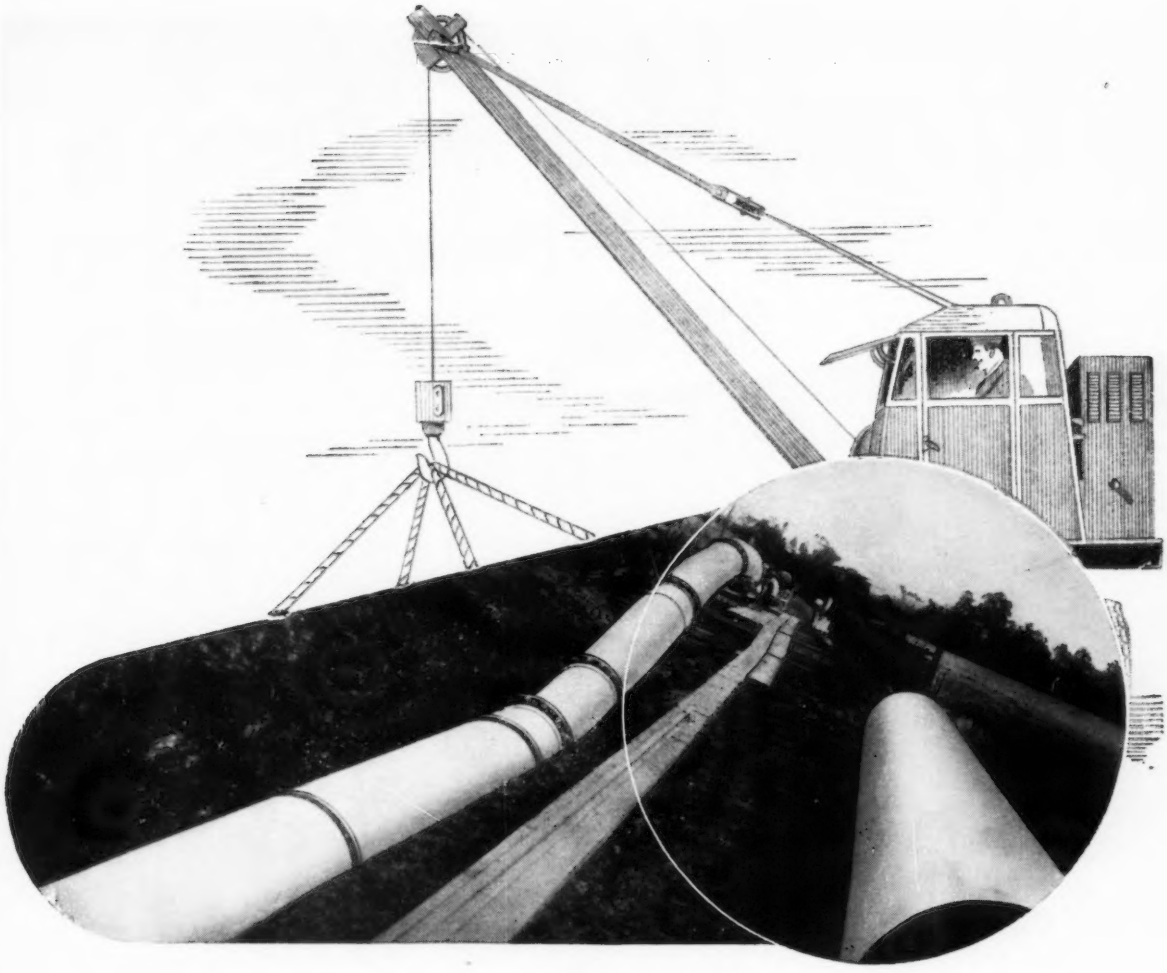

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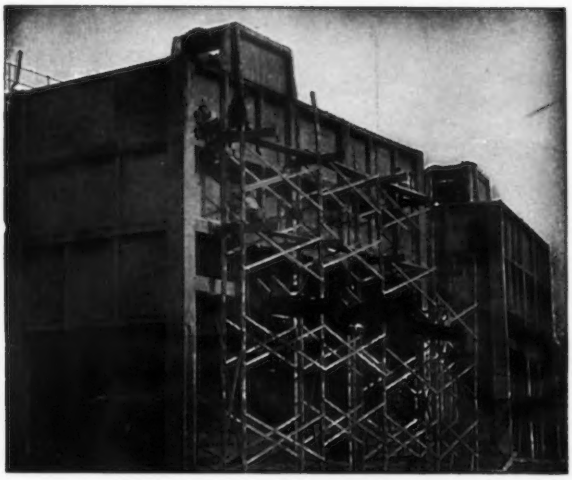

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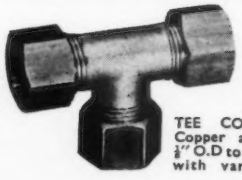

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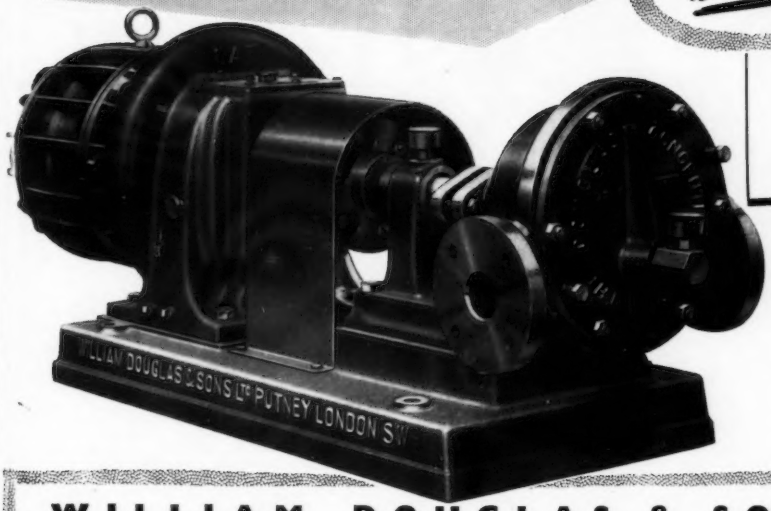

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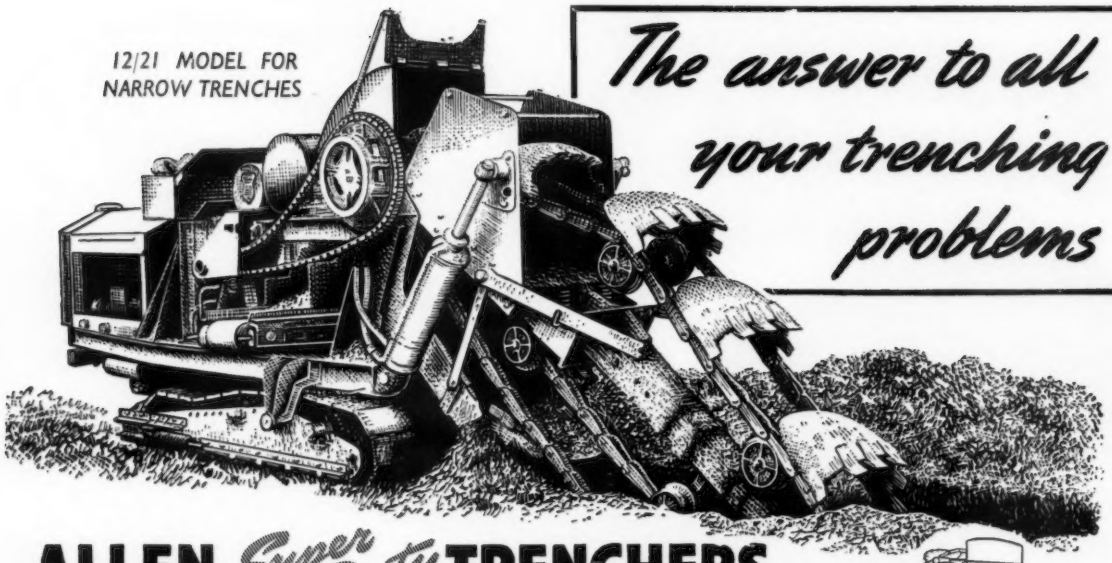

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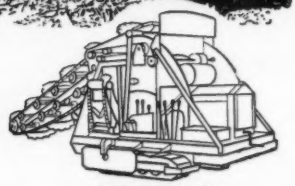

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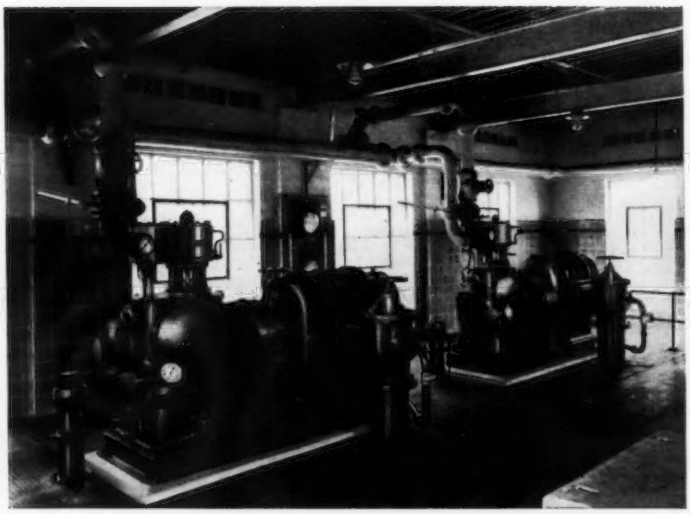

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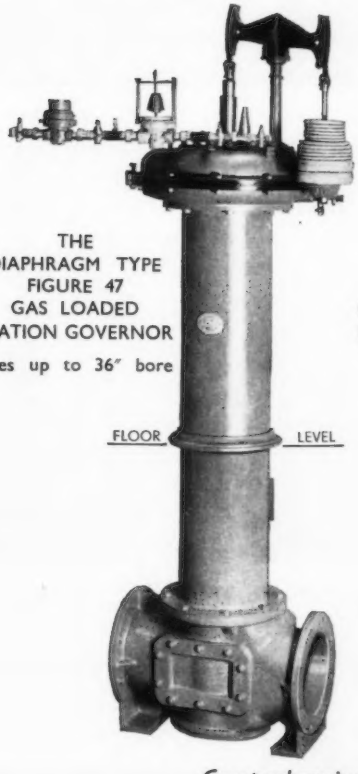

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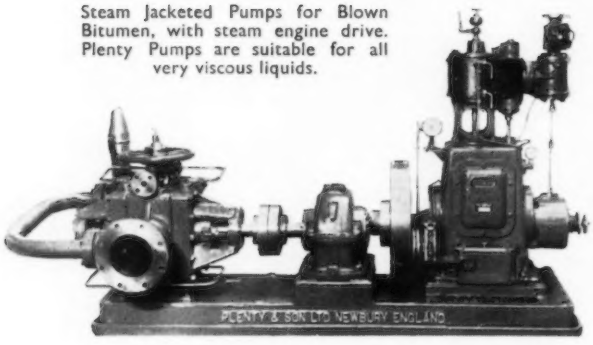

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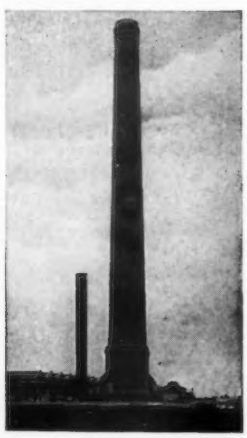

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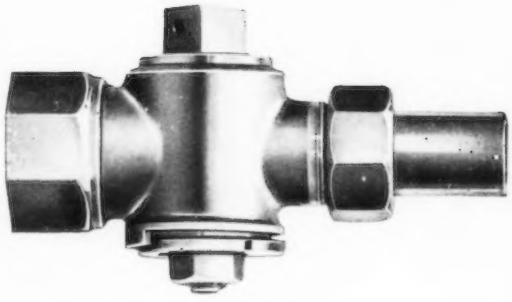

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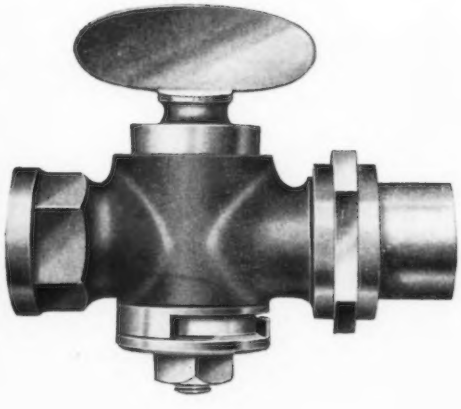

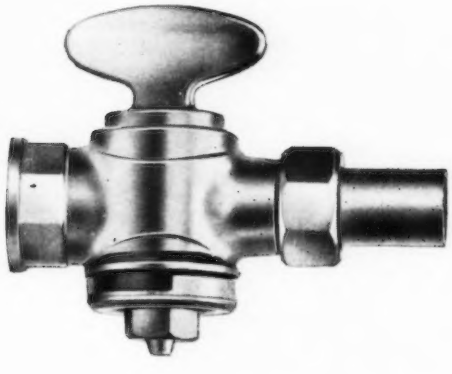

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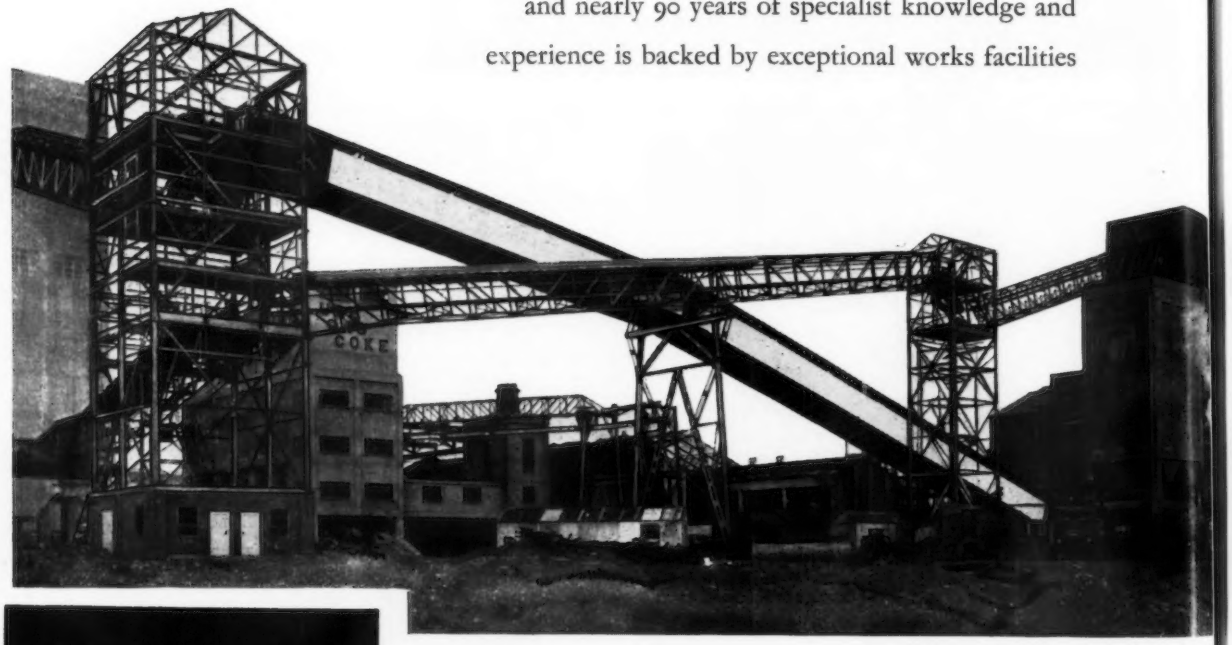

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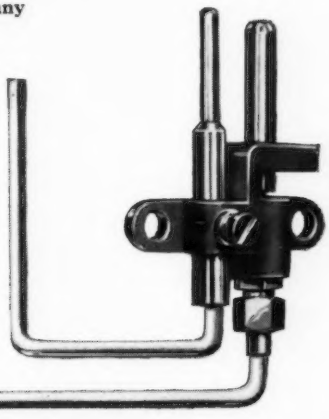

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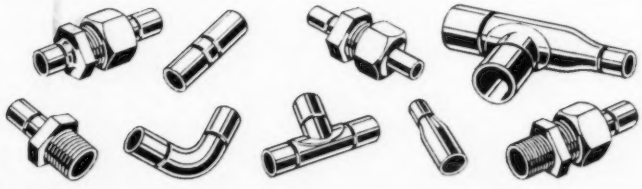

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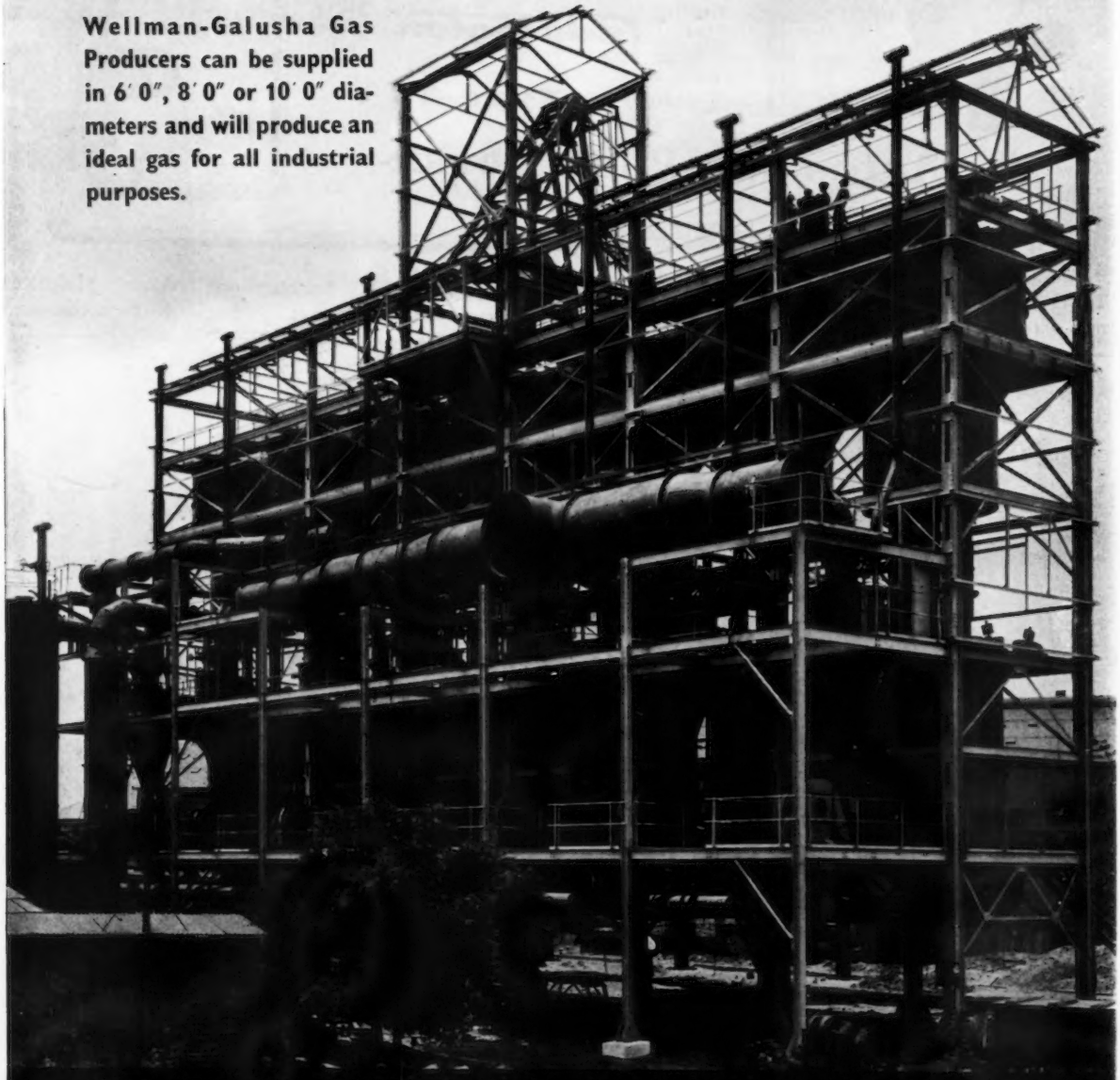

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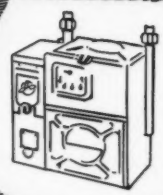

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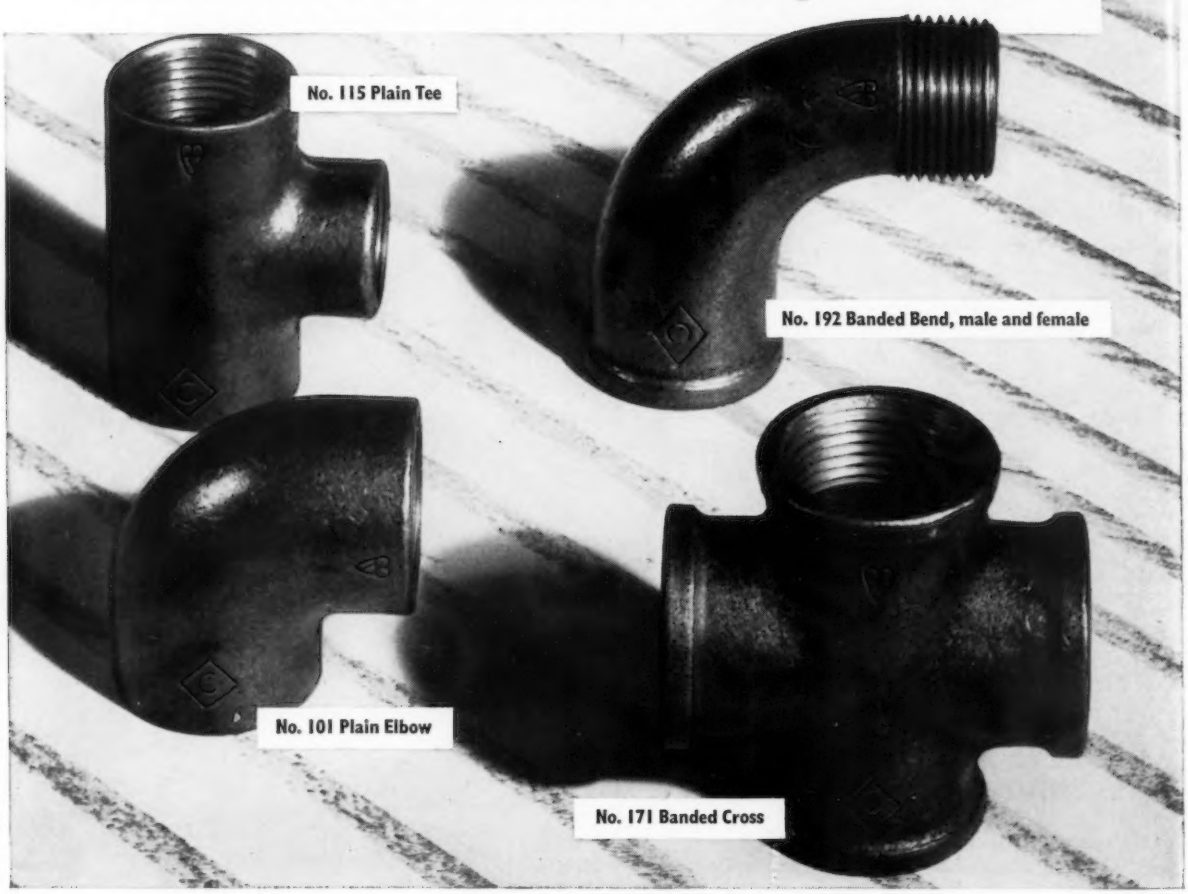

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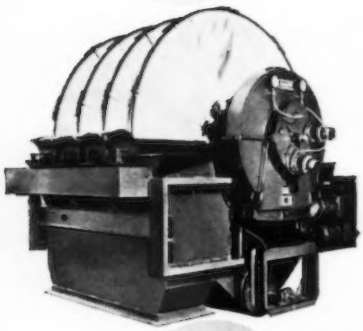

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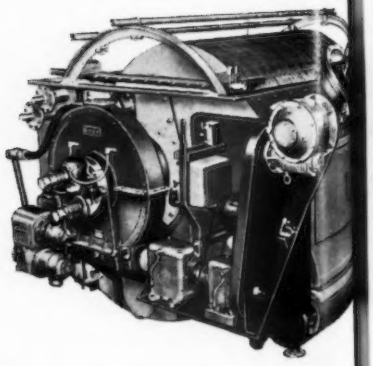

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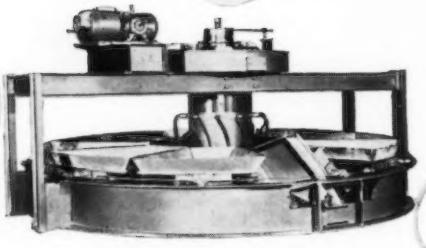

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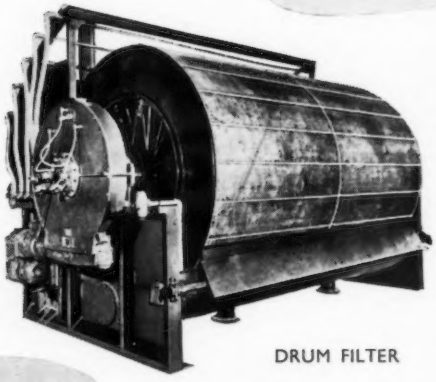

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Gas Journal

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108TH YEAR

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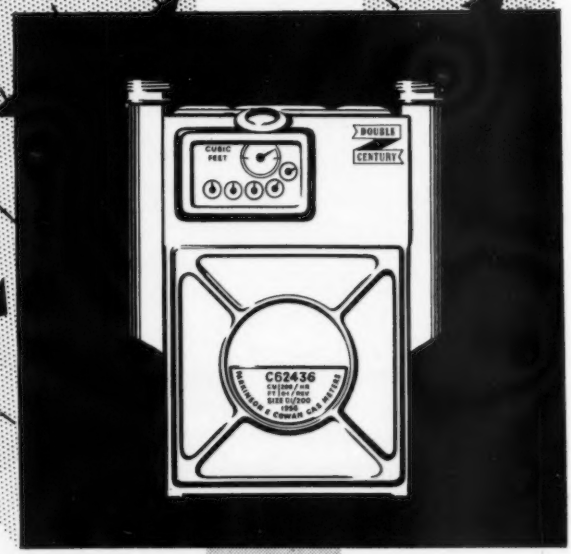

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TERMINAL HOUSE GROSVENOR GARDENS LONDON SW1

Gas Journal

VOLUME 285. No. 4832. JANUARY 11, 1956. 108th YEAR

A Signpost in the Fog

NOTHING could have brought the problems involved in overcoming air pollution to the public's attention more effectively than the smog which descended on the country last week, the most poisonous since that of 1952 in which 4,000 people died in London alone. Chaos reigned in air, sea, rail, and road transport as the fog belt blanketed nearly 30 counties and spread over 30,000 square miles. The newspapers seized on the calamity with characteristic enthusiasm and the word 'smog' stalked across the headlines like a herald of doom. However, in doing its job so thoroughly—and that includes making much of this new and picturesque word—the Press is doing a major public service. 'Fog' is regarded by the man in the street as an Act of God; 'smog' is unmistakably a sin of man. And that distinction was heightened by the fact that although London was one of the worst-hit areas, the City—now a smokeless zone—remained comparatively clear. The moral was obvious.

One point of interest to Londoners was the little army of scientists and chemists who began their first full-scale investigation to find out why smog kills. At their headquarters at Cunard House, Regent Street, two chemists directed the work of 250 Civil Defence men and women who, operating in Commando style, took samples of the poisoned air.

The Clean Air Bill relies for its effectiveness on many things, and it might appear that the most important of these is the zeal and efficiency of local authorities. But of course in the long run the success of the Bill rests upon public opinion, because the menace of smoke is, more than anything else, a matter of personal responsibility. At the present that sense of responsibility is unreliable and fluctuating. When we are enveloped in smog, people become smog-conscious; when the smog lifts, the awareness of personal responsibility lifts with it. But progress is being made. The advance in public opinion is considerable but it is mainly in what is aptly called 'responsible opinion'—that is, the opinion of the small minority of people in responsible positions is at first followed and then pushed on by mass public opinion. That process is only just starting and there is a long way to go, but there is good reason to hope that in time the thing will snowball, spurred on by developments in technology, administration, publicity and education. Unfortunately, however, nothing is more likely to induce a rapid change of heart than further doses of last week's unwelcome visitor.

It is during such periods that all eyes turn to the gas industry, for the reform can proceed only at the rate at which smokeless fuels can be made available to replace raw coal. Last week the B.B.C. broadcast appeals to people in fog areas to burn coke or other smokeless fuel and not to bank up their fires. This might have been regarded as wonderful publicity had supplies of coke been adequate to meet the needs of the moment. There is a danger that coke may become *too* popular as a domestic fuel, and it is obvious that the rate of establishment and extension of smokeless zones must be regulated in accordance with the availability of smokeless fuel.

It has been pointed out with good reason by Dr. Arnold Marsh, Director of the National Smoke Abatement Society, that there is a kind of circle of difficulty, almost a vicious circle, in that developments in the production of solid smokeless fuel have been held back because there was no certainty that more extensive smoke prevention measures would come and create a demand for it, while at the same time there has been a fear of introducing new legislation because there would be insufficient smokeless fuel. What we have to do is to ensure that the circle starts moving the other way round—to see that the establishment of smokeless zones encourages the further production of smokeless fuel, which in turn will make further zones possible. As Dr. Marsh has said, it may not be easy to achieve this smoothly and yet make good progress, and it is likely that for some years to come there will have to be a near-shortage of smokeless fuel.

The Clean Air Policy presents at once a challenge and an opportunity to the gas industry. The opportunity is that of rescuing coke from the indignity of a waste product and promoting it to the honourable (and lucrative) position of a refined, solid, smokeless fuel saleable at a price commensurable with the claim (the modest claim) that 16 cwt. of it is as effective as 1 ton of household coal.

The big symposium presented to the autumn meeting of the Institution, although it covered other fields, provoked a debate which centred mainly on quantitative problems. Can we make enough coke, and that without adding catastrophically to the cost of gas? The interesting joint meeting last month of the Manchester and District Section with the North Western Section of the Institute of Fuel, when the proceedings might have been regarded as a 'little symposium,' was concerned mainly with quality and utilization in domestic appliances.

Dr. Foxwell summarized the effect of the Bill on the domestic consumer, but the outstanding point in his excellent paper was that the implementation of the Bill as it stands will be largely in the hands of the popularly elected local authority. If a town council is to declare the whole or a substantial part of the district it governs a 'smoke-control area,' it will have to be satisfied that sufficient supplies of good quality smokeless fuels are immediately available, and what is more important, that if these fuels are not suited to a considerable proportion of existing appliances, these appliances can be converted at not too great a cost to its constituents either direct or by way of rates. But Dr. Foxwell went further. He gave the warning that if a smoke-control area is declared and if the premises on which it is based are not fulfilled it is very unlikely that the area will be extended.

Mr. Coley, of Radiation Ltd., showed conclusively that there is now available a very big range of appliances in which coke can be advantageously used, so advantageously in fact that the ratio of 16 cwt. of coke to 20 cwt. of coal is seen to be an understatement. It is clear that we need not be too much obsessed by the popular love of the open fire. Not that the open fire need have any terrors for us. There are many models of the open fire properly designed which will use satisfactorily the normal gasworks coke, provided this is reasonably graded, de-dusted and supplied with regularity and consistency. But to contend that we must put up indefinitely with the domination of the open fire is pure defeatism. We need to go forward with the popularization of appliances in which ordinary gasworks coke can be used with twice the efficiency which is obtainable in the open fire.

The debate is on. We understand that the big autumn symposium is to be further debated in the Sections. Already it is clear, as we have pointed out, that modifications of conventional gasmaking processes cannot produce the necessary greater quantities of coke which will ultimately be required. If the gas industry is to retain the market for domestic space heating additional carbonizing plant must be installed—and it is not too early to get on with it. Modifications in technique appear to be necessary, not, we suggest, because of the properties of the coke but rather to help in the achievement of a far more difficult goal, the balance between gas and coke in this and the market as a whole.

No doubt the debate will run off into a number of side issues, not by any means of small importance. There was for instance the useful paper on coke screening and preparation by Mr. Chancellor (last week's issue, p. 51). Even in the North West not all districts are served through adequate grading plant. It is vastly important that all urban districts, particularly those likely to be designated smoke-control areas, should be so served. The observations at a recent meeting of the North Western Fuel Luncheon Club by Mr. Alfred Robens on the marketing of coal are also relevant to this debate. He pointed out that while the intimate relations between a coal merchant and his domestic customers should be retained, fuel distribution should be effected from a relatively few depots properly equipped with handling, storing, bagging and weighing machinery. But in the future smoke-control area the merchant will be called upon to distribute smokeless fuels or go out of business. The point we have to debate is whether or not the gas undertaking should distribute through the existing nexus of coal merchant and customer. A shrewd point was made by a speaker at the joint meeting to which we have referred. Coke supplies, he pointed out, are likely to be difficult sometimes. We should, therefore, concentrate first on maintaining regular supplies to regular customers, leaving the casual buyer to take her place in the queue.

The debate will sway this way and that. Is it really necessary to burden the industry with the cost of making, or trying to make with doubtful success, a coke which might burn in the old-fashioned open grate? Is it not apparent that normal gas coke (without even the three therms volatile content) can be used with a relatively cheap modification or substitution of the old appliance? There will be a considerable time-lag before the full demand comes upon us. Would it not be well to concentrate on supplying the regular customer first and to use the time in popularizing the use of appliances properly designed to make the best use of the smokeless fuels we can sell without increasing the cost of production? And after the debate, should we not proceed to the formulation of a definite policy, or it may be more than one definite policy according to the conditions prevailing in the several areas?

BATTLES ROYAL

DOWN on the first floor of Café Royal, that famous feature of the West End scene, two men bloodily shuffled the canvas before the distinctive National Sporting Club last Monday evening, providing after-dinner amusement for the recently revived traditional gathering. Up on the fourth floor another right royal battle was going on—with all the bitter atmosphere one can expect where professional reputations are at stake. M. Raymond Oliver, 'France's leading TV cook (a recognized profession?), chef, hotelier, gastronome, writer, painter and sculptor,' had thrown a challenge 'to any woman in the world and particularly to any Englishwoman' to match his culinary skill. In terms more generally used by the gentlemen on the first floor, this was a 'natural' for Mrs. Phyllis Cradock, of Bon Viveur reputation. It was also just the sort of ready-made affair that the Gas Council would handle so much better than anyone else. But as far as Mrs. Cradock's willingness to mix it is concerned we consider this to be pretty ungrateful, coming from a woman who has been accorded so many French titles such as 'Grande Dame de la Chaine des Rotisseurs,' that the list reads almost as long as the names of last year's French Premiers. The personality-coloured audience duly admired each other and we willingly acknowledge that only the Gas Council could have thought up such a clever list of invitations. Endeavouring to spoil the fun (in his self-appointed rôle, of course) was Mr. Gilbert Harding, no longer a gas industry publicity surprise piece and there were so many literary and

other personalities that there was ample justification for the comic-opera squads of cameramen who popped up everywhere. It was good to see Mr. Hutchison and Mr. Milne-Watson, the Chairmen of the South Eastern and North Thames Gas Boards, taking the whole affair very seriously. Nobody took it very seriously, however, when Mrs. Cradock smoked her after-dinner cigar down to the last. The whole affair was an extraordinarily happy party, with the wine flowing freely and with waitresses circulating with oysters and black sausage.

Each of the contestants devised and presented three dishes based upon a crêpe, a bird and a soufflé. The three most fortunate people present were the judges, Mrs. Constance Spry and M. Eugene Kaufeler of the Dorchester and M. Dupon of the Café Royal. The 'seconds' were Mr. John Cradock, the rest of Bon Viveur, and Mr. Erwin Schleyen, managing director of a London restaurant. The contestants drew but the judges thought Mrs. Cradock's dishes were 'original and worthy of inclusion in the classic repertory of fine cooking.' The table arrangements and wines were also taken into consideration. Honour satisfied, the duel ended with Mrs. Cradock taking the rough with the smooth—kisses in the finest French idiom from the bearded M. Raymond. The contestants will now appear on French television at the equivalent of Britain's Ideal Home Exhibition—L'Arts Menagers.

VOTES OF THANKS

SITTING as we do as silent watchers of countless meetings of gas engineers, salesmen, and so on, we are puzzled by one nagging question: Why is it usually considered necessary to go through the rigmarole of votes of thanks to speakers, laboriously proposed and seconded? Our criticism in no way suggests that the speaker should be left with the feeling that his efforts have been met by ingratitude; on the contrary, since we believe that the duty of expressing the company's thanks should rest with the chairman it is likely that the sentiment will be delivered rather more effectively than is usually the case. The reasons for this suggestion are two-fold: On the one hand we submit that it is quite wrong for the proposer to take the opportunity of making what is in effect an overlong contribution to the discussion (and one moreover to which the speaker has no come-back); on the other, we think it is small compliment to the speaker to have, as so often happens, either proposer or seconder resort to a hurried and stereotyped phrase or two, often because he has been pressed into performing this duty at the last moment. It is a pleasant thing to thank people, and even pleasanter to be thanked. Why then should we not make the process easier for all concerned? It would seem that the only reason likely to be put forward for continuing past practice is that it constitutes a break with tradition, but is that necessarily such a bad thing? We strongly support the retention of the courtesies of life, but first they must be proved to be courteous. We believe the courtesy of meetings would be best preserved by letting the chairman say 'thank you.' That is our proposal—would anyone care to second it?

ALL THEIR OWN

OF the many functions held during the Christmas holidays to attract the attention of young people, probably the most successful is the Schoolboys' Own Exhibition which is now being held at the Horticultural Society's Halls, Westminster, London, until January 14. For this is all the schoolboys' own (apart from mothers, fathers and sisters in attendance). Testimony to the exhibition's great appeal is the queue of boys always to be seen stretching for hundreds of yards outside the New Hall. Inside the Hall movement is largely a matter of elbowing and gentle shoving. The loudspeaker system constantly exhorts visitors to see everything as quickly as possible and to cross over the road to the other hall—only to be confronted by an equally long queue. Each day, the cleaners are presented with a Trojan task; the floor freshly littered with apple cores, ice cream papers, lolly sticks, cola bottles, and sandwich wrappings—not to mention 'hand-outs.' The design of the stands is of a very high order. Unfortunately, however, we have to record that the decorations on some of the stands disappeared rather mysteriously on opening day. Flying the flag for the gas industry is the Gas Council whose stand—which represents an old time music hall—contrasts attractively with more modern notions. Here boys (and girls) are invited to try their hand at such domestic duties as frying an egg and making pancakes. They are instructed by experts. The star performers are allowed to eat what they cook or are given free ice-cream. The red-upholstered seats in front of the stage provide an opportunity to sit down and eat sandwiches in comfort. The electricity industry concentrate on careers and the main stand, that of the E.D.A., is extremely popular. It is designed as a fairground and the boys are invited to 'have a go,' and an ingenious mechanical apparatus enables them to see to which branch of the industry they are most suited. Various large electrical concerns are there to supplement the activities of the E.D.A., and here the gas industry is at a disadvantage for the Gas Council stands quite alone. But among the space-men, cowboys, railways, electronic beams, and aircraft, an old-time music hall and cookery can obviously hold their own with the modern boy.

THE QUIET HEROES

INEVITABLY, in every industry, there are hazards. Sometimes these are widely recognized—as in mining for example. But where the incidence of fatality is low few people realize that it is only constant vigilance that prevents more frequent accidents. Whenever death and injury cast their black hands upon men whose labour merits some less unjust reward it is particularly sad. Sometimes it is noble, too. We record our humble admiration of the heroes who died or were injured when they tried to assist a colleague in the Felixstowe explosion last week. We shall not know the full story for some time but it appears (report p. 89) that Mr. Victor Rogers and Mr. Frederick Durrant were trying to fight their way through fumes to save Mr. Robert Hubert, when the explosion occurred in the governor house. Mr. Rogers died at the scene and Mr. Durrant died the following day in hospital. Undoubtedly there were others who were attempting to assist. One thing is not in doubt. All knew the possibilities. They made that decision which one must make at some time or another—perhaps in the moral, or possibly in the purely physical sense, as in this instance. They are by no means the first or last of the quiet heroes who suffer willingly. To the relatives of the bereaved we tender our sympathy on behalf of the gas industry and the community.

WORKS TRAINING

The Education Committee of the Institution of Chemical Engineers has prepared a leaflet intended for guidance on the practical training of young men who are entering the profession of chemical engineering through apprenticeship schemes. It is explained that the leaflet must not be accepted as a rule, but only as a guide that should be read with regard to local conditions. Practical training must be complementary to the technical college course and will depend to some extent on whether 'day release' or 'sandwich' courses are taken.

Personal Notes

MR. K. A. HOGAN, MR. W. H. SHARLAND and MR. D. G. BADHAM have been appointed Directors of Powell Duffryn Ltd.

MR. R. G. TAYLOR, Group Accountant, Stamford, Lincs., has left this appointment which he has held for the past five years, and will take up a similar position, also with the East Midlands Gas Board, at Boston.

MR. G. W. HARVEY, District Engineer of the West Midlands Gas Board at Lichfield for the past five years, has been promoted to the position of Works Superintendent at Walsall. He is a native of Cannock Wood.

MR. J. W. BOLTON, Manager at the Chatteris, Cambs., undertaking since June, 1950, is moving to Saffron Walden as Gas Engineer following the closing of Chatteris gasworks and the integration of gas supplies at Chatteris, Whittlesey, March, Wisbech and Peterborough.

MR. T. E. DUNPHY has taken up an appointment as Chief Assistant Engineer with the Cork Consumers' Gas Company. Mr. Dunphy, who was formerly Mechanical Engineer with West's Gas Improvement Co., Ltd., is an Associate Member of the Institution of Mechanical Engineers.

MR. R. ST. C. SANDALL, B.SC. (ECON.), has been appointed Secretary of the British Coking Industry Association. Mr. Sandall succeeds MR. F. GREENWELL who has retired, after fifteen years' service with the Association. MR. R. J. GODSON, M.A., has been appointed Commercial Officer.

MR. ROY W. F. BROWN has been appointed district representative at Chatteris for the Eastern Gas Board, Cambridge Division. He joined the Cambridge Gas Company in 1939, and after serving during the war in the Royal Air Force he went into the distribution side of the industry, and in March, 1953, he moved to the Board's Cambridge sales department.

MR. CHARLES J. BRYANT, A.C.I.S., F.I.A.C., secretary of the Bryan Donkin Co. Ltd., and British Furnaces Ltd., for the past 5½ years, has retired at the age of 72. Mr. Bryant was the oldest employee of the Company, starting with the firm at Bermondsey, London, in 1898. As an appreciation of his services Mr. Bryant was presented with a cheque by the Directors and received a grandmother clock from members of the Staff. He will spend his retirement on the south-west coast. MR. E. ARNOLD, A.C.I.S., has been appointed Secretary of Bryan Donkin Co. Ltd. and British Furnaces Ltd., in succession to Mr. Bryant.

MR. J. R. RICH, B.SC., who has been promoted Engineer and General Manager of the Portsmouth, Gosport and Bognor Regis Gas Undertaking in succession to Mr. H. M. Lawrence, entered the gas industry as Technical Assistant with the Torquay and Paignton Gas Company in 1938, becoming successively Shift Superintendent and subsequently Works Manager. In 1947 he entered the service of the Portsmouth and Gosport Gas Company as Engineering Assistant, and on vesting day was attached to Isle of Wight as Deputy Engineer, his chief charge being the planning of the new central works. In April, 1953, he returned to the Portsmouth, Gosport and Bognor Regis Gas Undertaking as Assistant Engineer and General Manager, and since July, 1955, has been Acting Engineer and General Manager.

Obituary

MR. ALBERT SMITH, a former blast furnace manager with the Consett Iron Co. Ltd., has died at Staithes, near Whitby, Yorkshire, at the age of 66.

MR. GEORGE LEVY, Vice-Chairman of George Cohen Sons & Co., Ltd., has died at the age of 71. He had been Vice-Chairman of the Company since 1928.

MR. HENRY OSBORNE, of Dudley Hill, Bradford, has died at the age of 74. He was for many years local superintendent at Drighlington gasworks, and two years ago was awarded a certificate for 54 years continuous service in the gas industry. He leaves a widow and a daughter.

Diary

January 12.—SOCIETY OF INSTRUMENT TECHNOLOGY: 'Liquid Flow Control,' B. W. Balls. Manson House, Portland Place, London, W.1. 7 p.m.

January 13.—SCOTTISH JUNIORS (WESTERN): Short paper evening. Papers by C. M. Miller and R. Taylor. Gas Showrooms, 522, Sauchiehall Street, Glasgow, C.2. 6 p.m.

January 14. — YORKSHIRE JUNIORS: Short Paper Day. 'Some Advantages of Training on a Small Gasworks,' P. R. R. Stead; 'Pipe Bridges,' D. Craven; 'Air to Purifiers by Injector,' C. Stanton. Gas Showrooms, Davey Gate, York. 2.30 p.m.

January 16.—EASTERN G.C.C.: Connaught Rooms, London, W.C.2. 2 p.m.

January 17.—LONDON AND SOUTHERN I.G.E.: 'Development of the Non-Domestic Gas Load,' E. Wulstan Atkins.

January 17.—NORTHERN G.C.C.: 30, Grainger Street, Newcastle-upon-Tyne. 11 a.m.

January 18. — INSTITUTE OF FUEL, YORKSHIRE SECTION: Presentation of two papers by Section members. Hotel Metropole, Leeds. 2.30 p.m.

January 18. — INSTITUTE OF FUEL, LONDON: 'Utilization of Steam and Power in Modern Gasworks and Coking Plants,' L. J. Clark. Joint meeting with Coke Oven Managers' Association (Southern Section). Institution of Civil Engineers, Great George Street, S.W.1. 5 p.m.

January 19.—MIDLAND JUNIORS: Half day visit to works of Quasi-Arc Co., Ltd.

January 20. — INCORPORATED PLANT ENGINEERS, BLACKBURN BRANCH: 'Smoke Abatement,' J. Lewis. Golden Lion Hotel. 7.30 p.m.

January 20.—JUNIOR INSTITUTION OF ENGINEERS: 'Some Notes on the Flow of Plastic Solids,' R. F. Twist. Pepys House, 14, Rochester Row, London, S.W.1. 7 p.m.

January 21.—LONDON AND SOUTHERN JUNIORS: Visit to Willoughby Lane Works, Eastern Gas Board.

January 23.—WEST MIDLANDS G.C.C.: Gas Offices, Edmund Street, Birmingham, 3. 2.30 p.m.

January 25. — EASTERN JUNIORS: 'Through Way for Gas,' Mr. Forsythe. Ipswich.

January 26.—INSTITUTE OF FUEL, EAST MIDLANDS SECTION: 'Recent Developments in Fuel Technology,' Prof. A. L. Roberts. Gas Showrooms, Lecture Theatre, Nottingham 6.15 p.m.

January 26. — INSTITUTE OF FUEL, MERSEYSIDE SUB-SECTION: Programme of technical films. Liverpool Engineering Society's Rooms, 9, The Temple, Dale Street, Liverpool. 7 p.m.

January 27.—JUNIOR INSTITUTION OF ENGINEERS: 'Principles of Fuel Technology,' S. A. Danton. Pepys House, 14, Rochester Row, London, S.W.1. 7 p.m.

February 3.—INSTITUTE OF FUEL, SOUTH WALES SECTION: 'Research at the National Coal Board,' Dr. W. Idris Jones. South Wales Institute of Engineers, Park Place, Cardiff. 6 p.m.

THREE DEAD AND FIVE INJURED AFTER FELIXSTOWE EXPLOSION

Two Die in Rescue Attempt

THREE men died and five others were injured after an explosion in the governor house at Felixstowe gas station last Friday. Fire broke out after the explosion, which completely shattered the governor house. During the emergency gas supply was maintained by taking it from the high-pressure main from Ipswich.

The three dead were Mr. Victor Rogers, 45, builder's foreman, father of two children, of Walton Avenue, Felixstowe; Mr. Robert Hubert, Speedwell Road, Chantry Estate, Ipswich; and Mr. Frederick Durrant, The Avenue, Trimley St. Mary, Suffolk. Mr. Durrant died in hospital on Saturday. Both Rogers and Durrant were attempting to aid Hubert at the time of the explosion.

Chairman at Scene

Sir John Stephenson, Chairman of the Eastern Gas Board, left London for the scene immediately on receiving news of the explosion. He visited the injured in hospital.

Before the explosion, at 9.35 a.m., Mr. Hubert was overcome by gas in the governor house. A spokesman for the Eastern Gas Board in London said: 'The explosion was followed by a fairly intense fire. We do not know the cause, except that it appears to have been an explosion of gas. Workmen were searching for an escape of gas in the governor house when one man was overcome by fumes.' There was some confusion about what exactly happened after that.

Overcome by Fumes

Men were searching for a leak in the governor house when one ran out saying Mr. Hubert had been overcome by fumes. Mr. Rogers, working in an adjoining builder's yard, was called and a doctor summoned.

Rogers ran 150 yards and fought his way through fumes in an attempt to reach Hubert. Both died when the control room of the gasworks was shattered by the explosion, which broke windows a quarter of a mile away. Durrant followed Rogers into the gasworks in the rescue attempt.

Dr. Alexander Sherlock was seriously injured the moment he arrived at the scene in his car. An eye-witness said 'It seems he drove right into it.'

The Injured

Also injured and detained in hospital were Mr. E. Sparrow, of Stour Avenue, Felixstowe; Mr. J. Mullet, of Oak Close, Felixstowe; and Mr. Walter Shaw, of Church Lane, Felixstowe. Mr. Michael Gant, 17, of Oak Close, Felixstowe, was injured but not detained.

Felixstowe's gas supply comes by pipeline from Ipswich, 12 miles distant, and the governor house controls the pressure of gas in the mains in the town. Windows were broken in houses over a quarter of a mile from the scene of the explosion and doors burst open by the blast. A bungalow near the gas plant was extensively damaged but the occupant, Mrs. W. West, was out. Fire appliances from Ipswich and Felixstowe were called and the fire was extinguished after about an hour and a half. The firemen used clay to plug the main, from which burning gas was leaking.

Firemen examining the wreckage after the explosion in the governor house at Felixstowe gas station.

AREA BOARD MEMBERS RE-APPOINTED

The Minister of Fuel and Power has made a number of part-time re-appointments of members of the Area Boards. They are as follows:

Eastern: Mr. G. Calder, C.B., of London, and Mr. J. W. Napier of Ipswich.

East Midlands: Sir John Green, J.P., of Sheffield, Sir Edward Herbert, C.B.E., of Loughborough, Mr. S. J. Perry of Leicester, and Mr. R. M. Stevenson of Rotherham.

North Eastern: Professor A. L. Roberts, PH.D., F.R.I.C., Mr. R. Walton, of Leeds, and Mr. J. Owen of York.

North Thames: G. D. Dillon, of London and Mr. L. C. Hansen, M.B.E., of Woodford, Essex.

Northern: Lord Adams, O.B.E., J.P., of Workington, Cumberland, and Colonel H. Haswell Peile, O.B.E., of Newcastle-upon-Tyne.

South Eastern: Mr. Tom Brown, J.P., of Croydon, and Mr. K. W. Hickman of Wadhurst, Sussex.

South Western: Mr. Laurence Easterbrook, C.B.E., of Torquay, Mr. E. R. V. Porter, of Bristol, and Alderman H. E. Wright, J.P., of Plymouth.

Wales: Councillor J. E. Emanuel of Neath, and Sir William Jones, C.B.E., J.P., of Ruthin.

West Midlands: Mr. A. E. Hewitt, C.B.E., M.C., J.P., of Burleigh, near Stroud, Sir Arthur J. G. Smout, J.P., of Sheriff's Lench, Evesham, and Alderman C. G. Spragg, O.B.E., J.P., of Birmingham.

Sir John Stephenson, C.B.E., J.P., Chairman of the Eastern Gas Board, has been reappointed by the Minister of the Fuel and Power to that position.

Glasgow Meter Men Out on Strike

Within minutes of resuming work on January 4, after their New Year break, Glasgow's gas meter collectors voted to come out on strike. They walked out of the city's Gas Board headquarters and returned home—'determined to stay out until our demands are met.' Every collector in Glasgow—about 100 in all—is involved in the dispute. But, although they voted unanimously to strike, they were divided in stating their reasons.

They were due to begin a new system of collection on January 4. The management introduced mass surveys, which completely revise the former practice. Until now, each collector has been responsible for a particular area. Under the new scheme, however, groups of collectors would concentrate on 'cleaning up' one district after another. This, claim the men, would involve them in additional expenses for travelling and meals.

UNDERWATER EXTENSION TO SUTHERLAND SHIRE

THE idea of extending its supply to the Sutherland Shire, South of St. George's River, has been canvassed off and on by the Australian Gas Light Company for many years. St. George's River comprises a salt water estuary leading into Botany Bay. The district between this estuary and the next similar estuary southward is known as Sutherland Shire—a beautiful area which is rapidly expanding into one of Sydney's most important suburbs, with a population potential in the near future of 100,000. New homes are being completed at a rate of 30 to 50 per week.

By N. G. MATHER,
B.Mech.E.,
M.Inst.Gas Eng.

At first sight it appeared that the easiest method of crossing St. George's Estuary would be by the bridge at Tom Ugley's Point, but on reflection it became clear that such a crossing would not have been the most effective. The reticulation gas mains leading to Tom Ugley's Point are quite small in diameter, but on the other hand there is a 12-in. diameter feeder main to Sans Souci. Moreover, on the opposite side of the estuary from Sans Souci, at Taren Point, a substantial district nearby has been proclaimed an industrial area. It was therefore logical that the possibility of continuing the gas supply at present existing to Sans Souci as a high pressure main under St. George's River from Rocky Point to Taren Point, a distance of 2,500 ft., should be first considered.

Top of page: *Minor difficulties experienced at pontoon No. 13.* Left: *Pipeline with supporting pontoons being towed into position.* Right: *Aerial view of pipeline shortly before submergence. The 21 pontoons are spaced at intervals of 80 ft.*

Right: *Aerial view of pipeline before straightening out by means of a heavy winch located at Taren Point (nearest camera).*

Marine surveys were undertaken, and whereas initially it was feared that the underwater crossing might entail considerable difficulties, these surveys disclosed a very favourable condition on the ocean bed at that point, with the exception of a rocky shelf reaching some distance beyond low water mark on the Rocky Point side. This rocky shelf was suitably trenched.

Authorization to proceed with the project to supply Sutherland with gas was given during the first week of July, 1955, and the work completed on September 5, a total of nine weeks. This included the high pressure mains connected each side of the water crossing, a total length of four miles. Gas was turned on officially on September 28.

It was first proposed to use 6-in. diameter steel pipes for the crossing, served at an initial pressure of 50 lb. per sq. in. from an electrically driven compressor station at Sans Souci, with ultimate delivery pressure of 100 lb. per sq. in. However, sufficient 6-in. pipe for the underwater crossing, which was required first, was not available in time, so that an order was placed for 2,500 ft. of 8-in. internal diameter seam welded pipe made from ¼-in. plate. This order was completed in ten days and delivered to a coating factory at Regent's Park, Sydney. Before leaving the welding shop, these pipes, which were in 30-ft. lengths, were subjected to a 500 lb. per sq. in. hydraulic plus hammer test.

The means used to protect the underwater pipe consisted of descaling in phosphoric acid, priming, then wrapping with three layers of coal tar enamel, the second layer of which contained a reinforcing bandage of fibre glass cloth drawn into the hot enamel, and finishing with an impregnated 6-in. wide asbestos bandage applied directly on to the hot enamel of the third layer. To ensure the necessary negative buoyancy of the pipes and to make sure that they would not be moved by current or weather, they were finally coated with a 1½-in. thick reinforced concrete applied by cement gun. Ciment Fondu was used for the mix. These 30-ft. lengths were delivered to the fore-shore of Botany Bay near Rocky Point where they were welded into several sections, each about 350 ft. long, above high tide level. All welds were checked by gamma ray photographs and the whole of the pipeline construction was carried out to A.P.I. standards. The long sections were tested with air pressure and soapy water at the field welds and then taken out to the limit of low tide where they were assembled into one long continuous length 2,500 ft. long resting 12 in. above extreme low tide, and again tested with air pressure at 125 lb. per sq. in. The 350-ft. sections were carried out individually between tides and suitable means taken to keep the water from entering the pipe as it was joined between each tide.

Flotation was accomplished by 21 pontoons at 80-ft. centres and a number of 44-gal. drums at each end of the pipeline, by an incoming spring tide. Each pontoon, which was in halves with the pipe slung between, mounted a suitable winch for lowering the pipeline into its final position, operated by two men. The total flotation comprised over 300 44-gal. drums, each of which was tested before use.

The launching of the assembled pipe, which weighed 70 tons, was carried out on Monday, September 5, following a rehearsal on the previous Saturday. All personnel engaged on the operation were properly briefed in detail and a comprehensive time schedule was also prepared, since it was necessary to float the pipe and drop it into its final position, in a period of under two hours.

The services of St. George Motor Yacht Club were co-opted and they supplied 12 suitable craft, including two 35-knot speedboats, plus the services of three powerful trawlers. Provision was made for 24 sea anchors on the alignment of the crossing. Once floated, little time elapsed before the pipeline spanned the surface of the crossing, but there was some difficulty in drifting it through the sharkproof enclosure at the Taren Point side. This delay meant that operations were running about three-quarters of an hour behind schedule. However, commencing from flotation at 9.30 a.m.

Left: *Handling a 350-ft. section prior to transporting it to the limit of low tide (approximately at position of launch).*

only two hours elapsed before the pipe was finally aligned and lowered into its position on the sea bed. The whole of this difficult and somewhat hazardous job was entrusted to McDonald Constructions Pty. Ltd. The hazards included wind and weather, a possible 6-7 knot current, unskilled personnel (recruited on the spot), and the actual operation of lowering the pipe to the sea bed.

After the pipe was placed on the floor of the estuary, air and hydraulic jets were used to traverse its entire length, served from a special carriage mounted and running along the pipe itself. Air and water under high pressure were supplied from a floating pontoon which was pulled backwards and forwards from one shore to the other by means of suitable winches on each side. This process finally located the pipeline at a minimum depth of 3 ft. below the sand on the floor of the bay. Before coupling up to the 6-in. steel mains on each side of the crossing, an air pressure test at 125 lb. per sq. in. was maintained for 24 hours.

Besides the protection mentioned, means have been taken to inhibit corrosion by providing suitable cathodic current to the main at each side of the crossing.

It is interesting to note that the operation received considerable local press and cinema publicity and that the Company's gas salesmen are now busily exploiting the potentialities of the new supply.

NEW YEAR'S DAY GAS BREAKDOWN

A failure in the gas supply ruined dinners at Keighley on New Year's Day. About two-thirds of the town was affected. A North Eastern Gas Board official said the breakdown was caused by the failure of an automatic valve which helps to regulate the supply from a gasholder at the gasworks at Thwaites.

Police patrol cars and loud speakers toured the district warning householders of the risks from turned-on taps when the supply was resumed. Householders, particularly old people, requiring assistance were asked to notify the gas office. The supply was back to normal within an hour.

507 Savings Groups in Gas Industry

Figures issued by the National Savings Committee show that at the end of September last 899,317 workers in nationalised industries, the Civil Service and local government, were saving regularly through 13,293 savings groups. Local Authorities groups total more than 3,360, with a membership of 115,898. Group membership and total number of groups for the various nationalised industries include: National Coal Board 227,667 (1,014), British Electricity Authority 39,500 (613), Gas Council (Area Boards) 25,402 (507).

New Gasmaking Plant at Dumfries Progressing at Rapid Rate

THE new gasmaking plant at Dumfries gasworks is now rapidly taking shape. It consists of twelve 50-in. vertical retorts, with provision being made for an additional four, these to be built at a later date. Each retort carbonizes five tons of coal per day and all twelve retorts working together are capable of producing 1¼ mill. cu.ft. of gas per 24 hours. These twelve vertical retorts replace 48 obsolete horizontal retorts at present in use which were built 45 years ago.

Above the twelve vertical retorts are coal hoppers designed to hold 120 tons of coal, a quantity sufficient for 48 hours supply to these retorts. The new bench, and all necessary elevators and conveyors are housed in one building about 100-ft. high. The retort house in which this plant is housed is a steel-framed, brick-panelled building, the bricks of which have been carefully chosen so as to blend with the surrounding property.

Exploratory Work

The exploratory work carried out in connection with the foundations disclosed that the ground strata was most unsuitable to carry the great weight envisaged and piling was necessary. In all 98 piles 17½ in. in diameter had to be driven into the ground. These were driven to various depths varying from 12 ft. to 33 ft. before rock was reached. Each pile is designed to carry a total weight of 60 tons. While the ground for the foundations was being excavated, difficulty was encountered with water, as it was found that the natural water level was only 9 ft. below the existing yard levels and the deepest part of the foundations is 33 ft. below ground level.

Waste Heat Steam

Enclosed within the retort house building is also a waste heat steam boiler which will be capable of supplying the steam requirements of the works. As its name implies, the steam, because of the design of the retorts, is generated from the waste heat which in the old plant passed up the chimney and was lost to the atmosphere. Provision of this waste heat boiler eliminates the necessity of having to raise steam in the present Lancashire boilers, and this, coupled with the change to modern vertical retorts, means that the old nuisance of grit and smoke coming from the gasworks will be eliminated entirely.

Coal Handling

Conveyors and elevators are controlled in such a manner that no piece of plant can be started up outside its sequence, and throughout the whole plant at various points there are push buttons which can be utilized if anything goes wrong.

The old method of handling coal by emptying wagons by hand will be discontinued, and the wagons, one at a time, will be completely emptied by turning them almost upside down, and, after emptying returning them to the rail track, the whol operation taking something like seve minutes. Elevators and conveyors are al designed to handle 60 tons of coal pe hour.

Coke coming from the retorts is conveyed on a conveyor belt situated unde the retorts to an elevator which takes th coke to screens placed above the storag hoppers. The screens are so sited that the coke, before passing to the over-head storage hoppers, is graded into four different sizes, and the hoppers themselves are capable of holding 150 tons. The coke hoppers are sufficiently high that rail wagons can pass underneath and, by merely pulling a lever, a chute is opened and coke flows freely into the wagons, the whole operation of filling a wagon taking only a matter of minutes.

To avoid noise at night, a 60-ton hopper is being installed, into which the coke made during the night is placed to be stored until next day, when it will be graded into the various storage hoppers. When the coke plant is in full operation coke consumers will have a choice of four different grades. All gasmaking material entering the works will be mechanically handled, and tar and coke leaving is similarly treated. While the erection of the plant is behind schedule at present, it is hoped that gasmaking will be in operation in the spring of next year.

'DESIGN OF WELDED STRUCTURES' COURSE

A further course on the 'Design of Welded Structures' is to be held in Cardiff during 1956 following a very successful course held there this year.

The course will commence on March 14, 1956, at British Oxygen Gases Ltd., Birchgrove Works, Cardiff, and the lectures will be held on Wednesday and Thursday evenings from 5.0 p.m. to 6.30 p.m. over a period of six weeks.

This design course is arranged to assist designers and draughtsmen of welded structures and fabrications, and the lectures will be given by members of Quasi-Arc technical staff. Further details and enrolment forms can be obtained on application to the Constructional Design Department, Quasi-Arc Ltd., Bilston, Staffs.

Dr. J. G. King has pointed out an error in his manuscript for the article 'Smokeless Fuel and the Gas Industry,' published in last week's 'JOURNAL' on p. 48. In the section headed 'Coke Combustibility,' in the second line of the second paragraph, and again in the first line of the third paragraph, the word 'decreases' should read 'increases.'

W-D were actively on site in 1955

25 NEW GASMAKING PLANTS

		Tons coal/day
	Aberdeen V	175
✓	Brighton III	406
	Cambridge III	214
	Christchurch, N.Z.	150
✓	Croydon IV	270
✓	Derby III	380
✓	Dover I	341
	Dover II	341
	East Cowes	245
✓	Edinburgh IV	259
	Edinburgh V	259
	Exeter	377
	Gainsborough III	18
	Glasgow, Provan II	436
✓	Glasgow, Tradeston II	179
	Grimsby VI	80
✓	Irvine III	18
	Lancaster, White Lund	418
✓	London, Kensal Green *(Complete Gasification)*	50
✓	Rotherham	617
	Solihull III	50
✓	Tingley II	511
✓	Tottenham V	557
	Truro	150
	Walsall II	821

15 NEW COKING PLANTS

	Avenue, Chesterfield	2175
	Beckton IV	603
✓	Cardiff IV	963
✓	Ebbw Vale III	444
✓	Ebbw Vale IV	444
	Irlam IV	431
	Monkton II	695
	Moss Bay III	1159
	Orgreave IV	858
	Pretoria V	1089
	Pretoria VI	1089
	Ravenscraig	1608
✓	Redbourn II	353
✓	Stanton II	918
	Vanderbijl Park II	1172

✓ Completed and put to work.

The figures following the Contract names denote the number of installations built at these Works.

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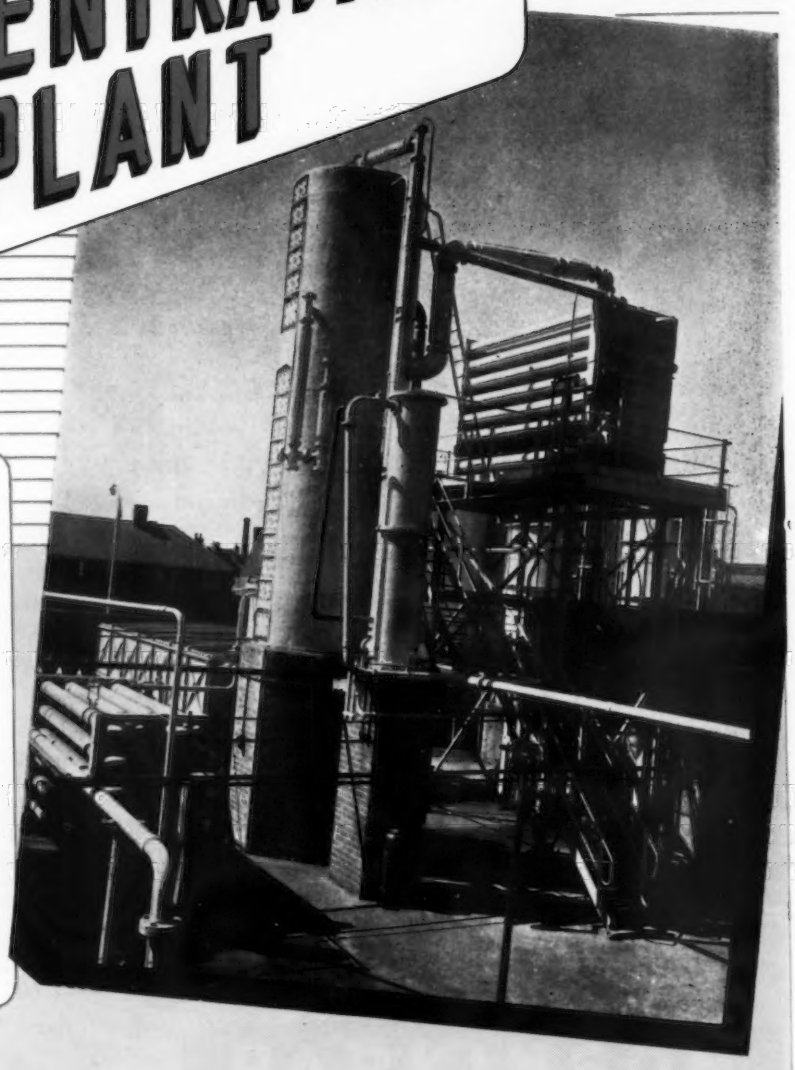
GAS LIQUOR CONCENTRATION PLANT



We specialise in the design and manufacture of Gas Liquor Treatment Plant and particularly Gas Liquor Concentration Plants incorporating dephenolation if required.

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Recent installations include a single unit of 72,000 gallons per day and the same principle of operation can now be applied to the smallest unit.

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Photograph by courtesy of the West Midlands Gas Board

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GAS COUNCIL—S.B.G.I. DECEMBER MEETING

Members of the Joint Consultative Council, S.B.G.I. and Gas Council, met at Gas Industry House on December 7 for the last meeting of 1955. Mr. R. J. Rogers was Chairman. On his right is Mrs. Eileen Murphy, Secretary to the Committee, and on his left are: Mr. S. G. Aberdein, Mr. A. F. Oatley, Mr. Duncan Wright, Mr. F. P. S. Stammers, Mr. R. J. Gregg (standing), Mr. M. W. Burt, Mr. S. A. King, Mr. J. W. Rogers, Mr. N. Hudson, and Mr. V. W. Stanton.

DISPUTED ACCOUNTS DISCUSSED

N.T. Consultative Council January Meeting

At a meeting of the South Eastern Gas Consultative Council in London on January 3, the question of the retention of meters in cases of disputed accounts was discussed.

Councillor A. B. Constable (in the Chair) reported that meters over five years old which were required to be examined would be subjected first to a running test and subsequently to a further examination after which they would not be used. If the meter was less than five years old it would be given a running test and would be retained in case there was a need for further examination.

On a suggestion by Alderman J. A. Larby, it was decided to defer the matter until after the West Surrey District Committee had met.

On the supply of coke in small quantities members of the Council expressed the view that this was not entirely a matter of poorer districts, as suggested by the Domestic Coke Consumers' Council in a letter to the National Federation of Coke Distributors Associations. The Council felt that there were many new housing estates, not only of flats but also of houses where there was very little space for the storage of coke. It was agreed that the matter should be brought before the Minister of Fuel and Power.

After the main business of the meeting, Mr. J. E. Davis, O.B.E., Chief Technical Officer of the South Eastern Gas Board gave a short interesting talk on the subject of the oil gasification plant to be built in Kent on the Isle of Grain. He explained that when the plant was working to full capacity it should produce about 20 mill. cu.ft. of gas per day, about a fourteenth of the area's requirements. There was, however, sufficient land to expand the plant to produce 80 mill. cu.ft. per day.

Builders' Merchants Describe Nationalised Industries as 'the Real Monopolies'

A memorandum to the Government from Building Industry Distributors—an organization with about 1,500 members—asserts that the 'real monopolies in this country,' are the nationalised industries 'with exclusive powers of production and sale,' and trade unions who have 'imposed or have the power to impose closed shop restrictions on employers and labour.'

The memorandum contains recommendations about the proposed new tribunal to deal with malpractices among traders and has the support of the Distributors of Builders' Supplies' Joint Council.

Another suggestion in the memorandum is that new terms of reference be drawn up for the existing Monopolies Commission to limit its powers to fact-finding once the new tribunal has been set up.

Building Industry Distributors say that to tie the proposed tribunal down with rigid terms of reference, leaving it unable to form judgments based on changed conditions, would hamper progress and development 'in the industrial revolution which is now gaining momentum so rapidly throughout the world.'

'For that same reason there should be no attempt to define the concept of abuse of the public interest too rigidly. The public interest also changes and is to a large extent dependent on outside factors, such as the state of the nation's prosperity, unemployment, availability of raw materials, the level of prices on the world market, capital available, foreign competition, and so on.'

TELEVISION FEATURE MERSEY TUNNEL PROJECT

The North Western Gas Board's main beneath the floor of the Mersey Tunnel (see 'GAS JOURNAL' of December 21) was the subject of a feature on Television Newsreel on January 2.

Viewers saw a pipe being swung into position and welded, a gammagraph being taken of the weld and the negative being examined. They also saw Arthur Owen the famous 'caterpillar man' being pulled through the 18-in. pipe on a concave trolley to paint the inside of the weld and thus protect it against corrosion.

The 6-ft. tall former Marine Commando who is now an employee of the North Western Board appeared in the same 'act' on January 10 in a programme called 'It's Easy When You Know How.'

Southern Gas Board to Receive Refund

The Kingsclere and Whitchurch, Hants., Rural District Council are faced with the refunding of £2,000 to the Southern Gas Board as a result of revaluation of property in the area. This sum represents rates paid in the last four years.

The Council have agreed to send a strong protest to the Minister of Fuel and Power against the adoption of a retrospective policy in the rating of gas boards, and are urging that the rating of gas boards should be dealt with in the same way as electricity boards.

North Thames G.C.C., before having their December 29 meeting, were escorted on a tour of the exhibition and research and testing laboratories at the Watson House Centre.

'FIRST CATALYTIC SULPHUR REMOVAL INSTALLATION ON GASWORKS'

W. C. Holmes' Contract

W. C. Holmes & Co. Ltd. announce that an order has been received from the Jersey Gaslight Company for plant for the catalytic removal of organic sulphur, of a capacity of 4 mill. cu.ft. per day. This is particularly interesting as it is the first catalytic installation for a gasworks under contract conditions. All previous installations of a commercial character have been carried out for firms requiring low sulphur gas for glass making, metallurgical processes, etc.

Divalent Metals

The process is characterized by passing the gas through a catalyst prepared from the molybdates of certain divalent metals, such as copper, nickel or cobalt, at temperatures in the region of 350/400°C. Under these conditions the organic sulphur compounds are hydrogenated and the by-product of the reaction H_2S. Thiophene, which is commonly found as a constituent of crude benzole, is not affected to any great degree.

Subsidiary reactions involve the destruction of nitric oxide, the stabilization of gum—forming hydrocarbons, the conversion of hydrogen cyanide to ammonia, and the substantial elimination of oxygen. No degradation of gas quality is found to occur, and the disappearance of oxygen along with its quota of hydrogen actually raises the C.V. by a small amount. This reaction in fact is used to furnish the major portion of the heat required to bring the gas up to the operating temperature, and this is the most economical means of doing so.

A full discussion of the process appeared in the 'GAS JOURNAL' on March 20 and 27, and April 3 and 10, 1946.

Experimental Plant

These articles include a description of the plant built for experimental purposes at the Ravensthorpe gasworks, to deal with the whole of the Mirfield Gas Company's make, and this plant was inspected by members of the Manchester District Gas Association shortly after it went to work in April, 1945. So far, the most important developments of the process have been in industrial installations, the largest to date having a capacity of 30,000 cu.ft. per hour for gas used for metallurgical purposes. Small industrial plants have been used extensively in the glass industry as well as in the metallurgical industries.

Gas industry and Economic Commission co-operate on language difficulties

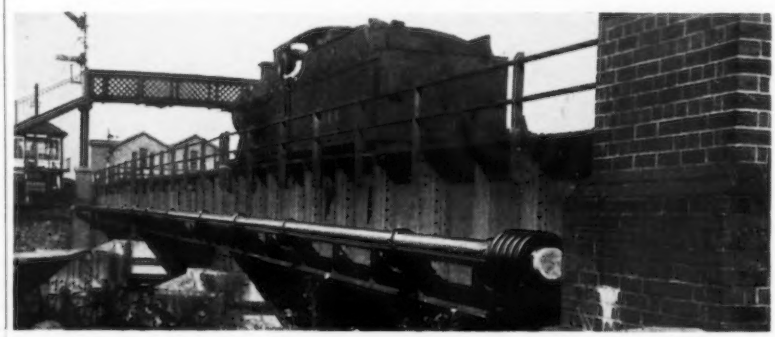
The International Gas Union Committee on Statistics of the Gas Industry met for the first time in Cologne for two days during December.

To satisfy the needs of the various international organizations taking an increasing interest in statistics of the gas industry, the I.G.U. feels that it has an obligation to study the subject. Apparently, the chief problem is that of the varying significance placed on units of measurement and terms used by countries at present compiling statistics. The resulting difficulties in the interpretation of figures not directly comparable hinder the work of compiling international statistics.

To counter these difficulties gas industry experts and experts from the Economic Commission for Europe are trying to agree definitions in the respective languages.

The Statistical Committee of the I.G.U. has studied the definition of some terms of a summarized statistical table for production.

The Cologne meeting was presided over by M. Touwaide, of Belgium. Representatives were present of France, Germany, Great Britain, Italy, the Netherlands, Switzerland, and the Economic Commission for Europe. Four other delegates, from Austria, Denmark, Spain and Sweden, sent apologies for their absence.



A picture of the 157-ft. length of pipe on the railway bridge which spans the Great Ouse at Bedford.

Part of Eastern area integration scheme completed ahead of schedule

The new gas main which will carry gas from the Bedford gasworks to the Sandy and Potton areas has been laid in advance of schedule. It forms part of the integration scheme which will eventually cover the whole of the Cambridge Division of the Eastern Gas Board.

Nearly 14 miles in length, the main consists of 8 in. and 4 in. diameter mild steel, the pipes being electrically welded together.

The specification laid down by the Eastern Gas Board provided that only the best and most suitable electrodes were to be employed for this exacting operation. The welded joints were regularly tested by gamma ray inspection, thus ensuring welded joints of a very high standard.

Delicate Operation

One delicate operation during the laying of this main was the lifting into position of a 157-ft. length of pipe on to the railway bridge which spans the Great Ouse at Bedford. This began at 6.30 a.m. one Sunday morning and the contractors were only allowed 12 hours on the bridge and adjacent track to avoid delaying the railway service. Faced with this time limit, the pipe was pre-fabricated by welding together shorter sections.

Two heavy mobile cranes negotiated, with some difficulty, the railway tracks and began slowly to lift the pipe—which at length came to rest on the brackets previously attached to the side of the bridge.

The whole operation was completed smoothly and efficiently by 4.30 p.m.—with ample time to spare—although there was an anxious moment when one of the cranes began to slip on the tracks. This was soon rectified.

Work on a further section of the main, extending from a point near Sandy to St. Neots, will commence this month and the main will then be continued to Huntingdon. From there, by means of two branches, it will eventually connect to Cambridge and Peterborough.

A new branch office in central London has been opened by Air Control Installations, Ltd., to deal with enquiries and sales in the London and South-East England area. The address of the new office is 17, Manchester Street, W.1, telephone WELbeck 1306.

CHRISTMAS LECTURE SCORES SUCCESS

Watson House Director uses humour and energy to describe 'Harnessing the Flame'

THE renowned wit of Mr. L. W. Andrew, Director of the Watson House testing and research laboratories, scored a great hit with the young people attending the Institution's Christmas Lecture at the Imperial College of Science and Technology, London, this year.

Clearly Mr. Andrew's secret in keeping the rapt attention which he thanked his audience for afterwards was that he did not 'talk down' to them and that he credited them with a good deal of intelligence. Even the Press did not fidget on their rock-hard bench at the front except when the experiments took on a violent aspect.

'Hot' Music

To begin with there was a touch of Christmas pantomime: a little humour at the expense of 'stinks' masters generally and a discourse on how gas was not intended to be used. This included a performance on organ-pipes played with a bunsen-burner by Mr. J. A. Prigg, whose prestige among his colleagues will undoubtedly now rate much higher.

The subject was 'Harnessing the Flame' and Mr. Andrew showed simply how the 'light-back' occurred, by allowing a flame to absorb the gas inside a 15-ft. glass tube and then increasing the pressure to show what ought to happen.

One can only select items at random, of course, for the whole lecture was a galaxy of entertaining and memorable—importantly so—incident with a sound theme of instruction running throughout.

In the first half of the lecture Mr. Andrew dealt with: (1) Making the most of available heat in flames; (2) combustion; (3) producing aerated and non-aerated flames; (4) provision of air for and removal of products of combustion; (5) supplying the fuel; and (6) control and safety devices.

After the interval the lecture took a more practical turn. This part was summed up as 'Modern methods of controlling flames and ensuring the fullest use of their inherent flexibility—including the use of electronic control.'

Mr. Andrew claimed that whenever anybody thought of anything new, somebody had thought of it before—usually the Chinese. He showed as an example a model of the first known gas-burner, a shaped clay pile which utilized a clumsy flame from natural gas. This model was connected to a gas tap on the bench, and after an initial explosion burnt nicely for a while. It was nevertheless a relief when it was turned off.

Automation

Mr. Andrew demonstrated the principles of the radiant fire effectively, made everyone remember how a flue-baffler works and allowed demonstrations of industrial processes requiring gas to go on all around him. The finale was provided by a piece of automation that would have shaken Jet Morgan. It was allowed to work through its cycle with such wonderful sonic effects that a reporter, whose right ear was but an ace away, writhed as if at the burning-stake.

Mr. Andrews shows how flame can be used with the maximum effect.

Among the many important personalities present was Mr. Michael Milne-Watson, C.B.E., Chairman of the North Thames Gas Board. Another was Master Andrew Milne-Watson, aged 11.

Mr. J. H. Dyde, Deputy Chairman of the Eastern Gas Board introduced Mr. Andrew and after the lecture went on to point out the virtues of the gas industry. He said: 'We who know it and believe in it know that it will extend well into the future and into the atomic age. It started when Napoleon was retreating from Moscow, when they first lit Westminster Bridge with gas. During the 150 years since then it has set a continuous and unbroken chain of progress.'

Expert from Radiation Lectures 700 Students

Musical flames, flames which burn without oxygen, flames which shoot across the room and others which travel as slowly as a snail were demonstrated to about 700 senior students from North Western Schools on January 2 and 6.

The occasions were the annual lectures arranged by the Institution of Gas Engineers (Manchester Section) with a view to interesting the students in scientific matters. Their subject this time was 'Flame', and the lecturer, who illustrated his theme with many arresting demonstrations and experiments, was Mr. F. Brinsley, head of the Technical Development Department of Radiation Ltd.

His first demonstration was given in the Main Hall of the Liverpool of Technology, Byron Street, Liverpool, and his second was in Manchester University's Lecture Theatre.

Children of employees of the South Eastern Gas Board were treated to a Christmas party recently in the showrooms in Terminus Road, Eastbourne. Before tea they saw conjuring tricks and after tea there was a film show.

SCHOOLBOYS MAKE THE PANCAKES

At the Schoolboys' Own Exhibition currently being held at the Horticultural Society's Halls, Westminster, until January 14, the Gas Council invites boys to try their hand at various domestic duties. The setting is an old time music-hall, complete with compère, 'stage' and red plush seats. Here, a young visitor tries his hand at pancake-making, after first being shown how to do it by home service advisers.

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The Regenerative O.N.I.A.—G.E.G.I. Catalytic Oil-Gasification Process*

By R. B. BROWN† Assoc.M.Inst.Gas E., A.M.Inst.F. and R. HACKETT†

AT the time of the West Midlands Gas Board's initial interest in catalytic oil gasification the practicability of the process on a commercial scale had already been demonstrated on a 300,000 cu.ft. per day plant built by Gaz à l'Eau et Gaz Industriel, for Gaz de France, at Cahors. This plant was non-regenerative, waste heat being recovered as steam. To obtain data complementary to that already available at Cahors, the Board, in collaboration with Humphreys & Glasgow, Ltd., built an experimental plant on the regenerative principle in 1951. It was thought that this was likely to be a better proposition on works in this country due to the availability of external steam from waste heat boiler plant, or steam raised from low grade fuels.

In 1954 G. le B. Diamond described the conversion of a disused 500,000 cu.ft. per day carburetted water gas plant at Solihull for experimental purposes (Institution of Gas Engineers, November, 1954). The carburettor and superheater were utilized as steam and air regenerators respectively, and an additional vessel of larger diameter was built to form a combined catalyst vessel and combustion chamber. The combustion chamber was incorporated to enable heating-up of the plant to be conveniently carried out and to provide a margin of external heat to facilitate temperature control.

The cycle of operations was based on a gas-making run and a heat restoring blow in opposite directions utilizing the heat of the blow gases for preheating the process steam and the heat of the make gases for preheating the air for the blow.

Auxiliary blow in the gas-making direction, which was originally provided for with the object of improving regeneration, was dispensed with during the early development work. Although regeneration was improved to the point where additional heat from fuel burned in the combustion chamber became unnecessary, experience showed that control of the plant was too difficult for this technique to be adopted as a permanent feature.

The early work on this plant was exceptionally encouraging, and instead of the short term development project, which had at first been envisaged, a much more comprehensive and detailed programme of experimental work was undertaken.

Development Work

Shortly after the commencement of the period under review, it was realized that after two years of arduous service the plant linings were in a poor condition, and since several modifications were scheduled a major overhaul was carried out during November-December, 1954. The catalyst vessel brickwork was completely renewed, the height of the steam regenerator was increased to give added capacity and to make a straight-through connection with the catalyst vessel, and the air regenerator was bricked up to reduce its capacity, leaving only a small regenerating space at the top of the vessel.

At the beginning of April, 1955, a larger impeller was fitted to the blower, and low pressure oil spraying equipment was fitted to enable make-oil to be sprayed into the top of the steam regenerator.

Early in June the top courses of chequers in the steam regenerator were replaced by sillimanite bricks to reduce oil and carbon penetration and subsequent deterioration.

During July, in view of the increased gas production which was being obtained and the limitation placed on further progress by the inadequacy of the ancillary equipment, together with increased back pressure through the scrubbers and gas mains, the catalyst bed was lined down to 60% of its original area. At the same time provision was made for burning, in the combustion chamber, the tar produced on the plant. The same burner was used, but a supply pipe separate from the oil line, with its own pump and control gear, was installed. This was connected to the oil line as close as possible to the burner, in order to avoid sludge formation due to mixtures of fuel oil and tar.

Since the publication of Mr. Diamond's paper, the further work which has been carried out and the progress made in improving the efficiency and output of the plant can be conveniently divided into a number of phases as follows:—

(a) September-October, 1954, when the plant was worked under conditions similar to those described in the previous report, with a period of continuous running as the objective.

(b) January-March, 1955, covering the continuation of working, as before the relining of the plant, but with a new charge of O.N.I.A. catalyst.

(c) April-July, 1955, operating with the oil being sprayed into the steam regenerator instead of into the catalyst vessel.

(d) August-September, 1955, working with a reduced diameter of catalyst vessel to determine the maximum obtainable throughput per unit cross-section of the catalyst bed.

(a) *September-October, 1954.*

The main requirement at this stage was for a considerable period of uninterrupted operation, in order to ascertain the results which could be achieved under continuous production conditions. Working during the early part of the period was marred by the inadvertent spraying of water, which had found its way into the oil by means not definitely determined, on to the catalyst, with the result that the top layer was shattered and 3 in. to 4 in. had to be removed.

During the final four weeks, however, the plant ran continuously, the average results being almost identical with those reported earlier. The calorific value, however, was a little higher at 472 B.Th.U. per cu.ft., compared with 445, this change being due to the reduction in thickness of the catalyst bed.

(b) *January-March, 1955.*

This period covered the recommissioning of the plant after the relining mentioned previously and with a new charge of O.N.I.A. catalyst.

The most interesting point arising was that with the same depth of catalyst as was used in 1954 and with similar working conditions, the minimum calorific value attained was 480 B.Th.U. per cu.ft. This was undoubtedly due to the fact that the surface area per cu.ft. of catalyst bed was less with the uniformly graded new catalyst than with the old material, which during its life had been broken down on several occasions from large sintered masses, with consequent reduction in the mean diameter of the particles. An increase in the catalyst bed depth of about 3 in. compensated for this loss in surface area and the calorific value was restored to 450 B.Th.U. per cu.ft.

The opportunity was taken at this stage to check the effects on results of variations in oil throughput, steam/oil ratios and quantity of air during the blow. From the results, the following conclusions were confirmed:—

(1) An optimum rate of steam admission exists, all other factors being constant. Use of a higher steam rate results in an increased CO_2 content in the make gas, while a lower rate results in a loss of efficiency.

(2) Similarly an optimum rate of air admission exists. A higher rate than this causes an increased CO_2 content, while a lower rate results in a loss of efficiency and, if

* From a paper to a joint meeting of the Midland Junior Gas Association and the Wolverhampton and District Engineering Society, December 12, 1955.
† Birmingham and District Division, West Midlands Gas Board.

prolonged, a build-up of carbon in the bed and a poisoning of the catalyst by sulphur.

(3) In general, the calorific value of the make gas varies inversely with the catalyst bed temperature, all other variables being constant.

The indications are that the thermal efficiency of the plant varies inversely with the calorific value of the gas produced, but no precise relationship has yet been established.

(c) *April-July, 1955.*

This was probably the most interesting period in the whole development of the process, since it covered the commencement of oil spraying in the steam regenerator.

At Cahors the oil spraying arrangements were such that they exactly suited the small diameter of the catalyst vessel. At Stafford, the diameter of the catalyst vessel was much increased, and the spraying arrangements had not been so satisfactory as was hoped. Mr. Diamond had suggested that an experiment should be tried with the pre-vaporization of the make-oil in the steam regenerator, but there was much delay in putting work in hand, for the Continental engineers disparaged this arrangement. However, the necessary equipment was fitted, and has been found most successful.

To begin with, 50% of the oil was sprayed into the catalyst vessel and the remainder into the regenerator. When this was found to be satisfactory, the percentage of oil sprayed into the regenerator was gradually increased and, after six days, spraying into the catalyst vessel was discontinued.

With this method of working it was found possible to increase the throughput of the plant, and in order to avoid a corresponding increase in calorific value a further 4 in. was added to the depth of the catalyst bed.

The daily make rose steadily from 270,000 cu.ft. to 350,000 cu.ft., with an accompanying increase in efficiency, values of 1.27 and 1.29 therms per gallon of total oil being readily achieved. The factor limiting output was back pressure during the make period, which at this rate gave plant pressures only 2 in. w.g. below blast pressure.

During this period, experiments were carried out on making gas of from 500 to 550 B.Th.U. per cu.ft. By simple adjustment of oiling rate and steam/oil ratios it was possible to produce a gas of this quality without any appreciable reduction in the daily volumetric output of the plant and with only a small falling-off in the thermal yield, values of 1.25 to 1.26 therms per gallon being obtained compared with 1.27 to 1.29 when making a gas of 450 B.Th.U. per cu.ft. The increase in calorific value and reduction in thermal yield were accompanied by an increase in tar production, about 8½% of dry tar being produced under these conditions compared with 6½% when making gas of 450 B.Th.U. per cu.ft.

At the end of this period it was found that the firebrick packing of the steam regenerator had deteriorated badly due to oil and carbon penetration, causing smoke emission during the early stages of the blow. Replacement of the top courses of checker by sillimanite bricks reduced smoke emission to slight traces confined to the steam purge before the blow. No smoke at all was produced at oil rates below 5 gal. per cycle. The new packing was found to be in good condition after four months of working at oil rates of up to 10 gal. per cycle, which represents a 400% overload on the original designed capacity of the vessel as a C.W.G. carburetter.

A small amount of coarse carbon grit was observed to be emitted from the stack during the blow due to carbon flaking from the regenerator brickwork.

At the end of this run, the catalyst was removed for inspection; no signs of deterioration were observed, the catalyst being in perfect condition throughout.

Spraying oil directly on to the catalyst had always resulted in the formation of a matrix of oil ash on the top of the catalyst. On this occasion, however, no trace of this ash was present on the bed, this material being found as scale on the regenerator brickwork.

(d) *August-September, 1955.*

The salient feature of this period was the increase obtained in output per sq. ft. cross-section of catalyst bed. Although the area of the bed had been reduced to 61% of the original, it was found possible to achieve the same rate of gas production as previously—that is, 340,000 to 350,000 cu.ft. per day. Here again it was found that the back pressure on the plant was the factor limiting any further increase in output.

During this period a further increase in make-oil conversion efficiency was obtained, values of 1.37 to 1.39 therms per gal. being achieved.

Also during this period the plant was successfully converted to tar burning. The standard burner as used for oil burning was employed, changeover valves having been provided adjacent to the burner to enable tar or oil to be used at will. No difficulties have been experienced with this system, tar being taken straight from the separator to the burner supply tank without any pre-treatment. Tars with 20% to 40% of water have been regularly used, and on one occasion tar of 53% water content was burned without any difficulty. Working at a calorific value of 450 B.Th.U. per cu.ft., the tar production of the plant almost exactly equalled the requirements of the process.

On August 15 the plant was changed over to a six-minute cycle. Results, however, were not very encouraging and on August 24 the nine-minute cycle was reverted to. Features of working on a six-minute cycle were persistence of smoke at the stack during the blow, accumulation of carbon deposits in the steam regenerator and a high carbon dioxide content in the make gas, this being about 12% compared with 10% on the nine-minute cycle.

Ancillary Plant

The cooling and washing plant consisted until recently of a washer-scrubber belonging to the original C.W.G. plant, with the packing removed, and two additional scrubbers, one without packing using water sprays and one packed with porcelain rings, circulating creosote for the removal of naphthalene.

Early apprehensions about the possibility of tar blockage had been shown to be unfounded, and a wooden grid type of packing was experimented with in the washer-scrubber. It was found that with a sufficient depth of this packing and a continuous supply of cold water, adequate cooling could be achieved in one stage, which allowed the secondary scrubber to be dispensed with.

The large quantity of naphthalene, which is in the region of 30 grains per 100 cu.ft., produced in this type of oil gasification process necessitates an effective method of removal, which must moreover take place on the cyclic side of the holder, unless the holder is to be maintained at an elevated temperature. For this purpose, creosote has the considerable advantage of being unaffected in its efficiency by small quantities of light tar. The use of petroleum fractions on the other hand would necessitate detarring, which, on the cyclic side, would mean providing a detarrer to cope with peak flow during the cycle, this being about three times the overall rate of production.

The creosote is regenerated by steam distillation, the mixture of naphthalene and benzole being rejected to the tar well and the stripped creosote returned to the system. The quantity of benzole stripped incidental to naphthalene removal on this plant is 0.061 gal. per 1,000 cu.ft., leaving about 2,000 grains of benzole per 100 cu.ft. in the gas at the scrubber outlet. In view of the high benzole content, the prospects of complete benzole and naphtha recovery are attractive.

Principal Aspects of the Process

While the proportion of blow to make is capable of some degree of adjustment, the ratio of 0.85 to 1 has been found the most satisfactory from the point of view of maximum output. This is considered to give the longest make period consistent with sufficient time for complete combustion of carbon without over-oxidation of the catalyst.

The present purge period, which occupies 9% of the cycle, could be considerably reduced by the provision of high-speed purge equipment, and this gear will be incorporated in the automatic operator of any new plant, with consequent increase in output.

The plant is simple to start up and easy to control in operation. For the purpose of starting from cold the plant is provided with an oil re-circulating line from the burner to the oil heater. Before lighting up, oil is re-circulated through this system until hot oil is obtained adjacent to the burner nozzle. The burner is then inserted, the atomizing steam and oil are turned on and the oil ignited by a pilot light. No difficulty has been experienced with this system, using either

heavy oil or plant tar. Heat-raising is continued until the catalyst bed is at a uniform temperature of about 900°C., when gas-making is started. From cold this usually takes four hours.

Adjustments of output can be obtained by altering the blow/make ratio within the cycle, by reducing the rate of oil injection (within certain limits) or by intermittent operation. By reducing the rate of oil injection the output can be varied, on the present plant between 250,000 and 350,000 cu.ft. per day, without appreciably affecting the overall efficiency of the process. In the case of intermittent operation, a shut-down of longer than eight hours duration necessitates a period of heat-raising, which involves losses in efficiency due to increased consumption of burner fuel and possible over-oxidation of the catalyst leading to a high CO_2 content in the gas.

Control of the calorific value over a narrow range is obtained by catalyst bed temperature adjustment through variation in the supply of fuel to the combustion chamber. An average gas-maker is quite capable of maintaining the required calorific value well within the limits of 10 B.Th.U. per cu.ft., provided a suitable temperature recorder is installed.

A range of calorific value variation of 80 B.Th.U. per cu.ft. can be achieved without loss of output by the normal adjustments to operating conditions. Use of such control for variations greater than this, however, leads to loss of efficiency, and for a permanent calorific value change of this magnitude an alteration to the depth of the catalyst bed is a better proposition.

If the required make and calorific value are predetermined, the appropriate steam and oil rates and cycle proportions can be preset by the technical staff, and the only adjustment which need be made by the operator, is to the fuel supply to the combustion chamber, to maintain steady temperature conditions. Thus the plant is capable of being controlled by semi-skilled labour, operation being no more exacting than in the case of ordinary retort house or carburetted water gas practice. Other than these points of control, all the attention required is normal supervision by technical staff and periodic checks on composition of make gas (including hydrogen sulphide) and blow gases.

Due to the absence of coke and ash handling, the labour requirements are considerably less than for carburetted water gas plant.

A 20-minute shut-down each day is necessary on the present plant for the purpose of cleaning the oil burner, oil spray and water filters. This could be considerably reduced by the provision of equipment designed for quick changeover. Any shut-down involving attention to the catalyst bed involves an interruption in output of four days, which is the minimum period during which the plant can be cooled down and reheated, allowing time for changing the catalyst.

The feedstock used during all stages of work on the process up to the present time has been Esso heavy fuel oil, recently reclassified as medium fuel oil. This oil is composed of residual oil from the distillation process, cut back to a viscosity of approximately 1,000 seconds with recycle oil, which is a product of the catalytic petroleum cracker. This combination produces a most undesirable feedstock for thermal cracking, due to the wide variety in its constituents, but it can be gasified at a good efficiency by the catalytic process. The behaviour of a straight run oil in this type of plant has not been tried.

Now that operational data on this oil is almost complete, it is hoped to continue the work using alternative feedstocks, since the ultimate utility of this process will depend upon its ability to deal with whatever fraction refinery operations and current demand make available most cheaply.

Residuals

The tar produced under normal conditions presents no difficulties in handling. It separates easily from the plant effluent in a simple baffled tar separator and is recovered in the form of an emulsion with a water content of from 25 to 50%, and a free carbon content of approximately 5%. Cold treatment by several surface-active agents in attempts to reduce the water content have so far met with little success, but the water content can be reduced to below 10% by heating the emulsion to above 200°F., followed by a 24-hour settling period.

The viscosity of the tar is lower than that of the oil from which it is produced. Combustion of the emulsified tar by a standard steam atomizing oil burner has presented no difficulties, even when lighting up from cold. Use of the tar as the burner fuel results in the saving of approximately 0.25d. per therm of gas produced. To this must be added the cost of treatment which would be necessary if the tar were prepared for sale.

Production of dry tar from the process varies between 5% of the make-oil equivalent to 0.036 gal. per therm or 0.15 gal. per 1,000 cu.ft. at a calorific value of 430 B.Th.U. per cu.ft. and 8½% of the oil at a calorific value of 520 B.Th.U. per cu.ft. equivalent to 0.066 gal. per therm, or 0.35 gal. per 1,000 cu.ft.

Since no effluent recirculation is practised at Solihull, the volume produced is large—of the order of 80 gal. per 1,000 cu.ft. of gas made. The nature of the effluent is indicated in the figures given below which represent average results obtained from tests on several samples carried out at the West Midlands Gas Board's Area Laboratory.

Total ammonia as NH_3	0.01 g. per 100 ml.
Thiosulphate as S	0.05 g. per 100 ml.
Thiocyanate as SCN	2.8 parts per mill.
Monohydric phenols	4.6 parts per mill.
Higher tar acids	160 parts per mill.
Oxygen absorption (4 hours at 27° C)	Total 460 parts per mill.

Tests carried out on aeration of the effluent, by passing through a miniature water cooler, have resulted in a reduction in oxygen absorption to approximately one-third of the above value.

Costs of Gasmaking

The following is an assessment of the costs of gas manufacture based on the following figures:—

Heavy oil	9 1/16d. per gal.
Steam	6s. 6d. per 1,000 lb.
Electricity	1d. per kWh.
Water	1s. 3d. per 1,000 gal.
Creosote	1s. 1½d. per gal.
Purification	1½d. per 1,000 cu. ft.
Catalyst replacement	0.27d. per therm.

Calculations are based on the following assumptions:—

Gas yield from heavy oil	1.37 therms per gal. (with no credit for tar.)
Steam consumption for all purposes	60 lb. per 1,000 cu. ft.
Water recirculation with make-up at the rate of	7.5 gal. per 1,000 cu. ft.
Creosote make-up	10 gal. per 1 mill. cu. ft.
Electricity	220 kW for a 3 mill. cu. ft. plant. Smaller plants *pro rata*.

From the above the actual cost of gas manufacture, which is independent of the load factor or size of plant, is made up as follows:—

	Pence per Therm
Heavy oil	6.80
Steam	0.99
Water	0.02
Creosote	0.03
Electricity	0.37
Purification	0.32
Catalyst replacement	0.27
	8.80

The cost per therm of labour supervision maintenance and capital depreciation will, of course, vary with the size of plant and the load factor.

Place of Catalytic Oil Gasification

The growing consciousness of the evils of atmospheric pollution by smoke is being reflected in considerably increased demands for coke. This increase, however, does not appear to be accompanied by a proportional increase in the demand for gas. This fact, together with the high cost and scarcity of good gas-making coals, does not hold out much prospect of further expansion in conventional carbonization. The demand for coke, however, could be met alternatively by replacing carburetted water gas with catalytic oil gasification plant, which rivals it economically, has a greater versatility as regards raw materials, and could in addition release large quantities of gas oil to meet the increasing demand for diesel fuel.

Although the development work is still incomplete in some respects, oil gasification using an oxidizable catalyst in a regenerative plant has emerged as a very promising process. Data have been provided for the design of a commercial plant, which should compare favourably with any oil gasification process at present in use.

CATALYTIC PRODUCTION

of Town Gas at Stafford*

By R. B. HOBSON, Assoc.M.Inst.Gas E.†

THE catalytic oil-gasification plant at Stafford was built as a result of development work in France, carried out by L'Office National de L'Azote (Onia), the manufacturers of the catalyst, and Gaz à L'eau et Gaz Industriel (Gegi) who are associated with Humphreys & Glasgow, Ltd. This plant differs from the Solihull plant of the West Midlands Gas Board in that it is uni-flow, whereas that at Stafford is reverse flow to obtain regeneration.

The Onia-Gegi oil gasification plant was initially put to work at Stafford on May 6, 1954. The plant (nominal capacity 1 mill. cu.ft. of gas per day) consists of three cylindrical vessels—namely, the combustion chamber, the preheater, and the catalyst vessel.

The cycle, which has been varied in length from 10.6 to 5.83 minutes, is roughly divided equally between 'heat recovery' and gas-making.

During normal working the plant is operated by an Humphreys & Glasgow automatic operator. In the 'heat recovery' phase, oil is burnt in the combustion chamber and the hot gases with added secondary air pass through the checker-filled preheater, where they burn-off carbon deposits on the checker work. The preheater also acts as a heat balancing vessel.

The carbon of reformation deposited in the catalyst bed is burnt off, imparting some heat to the catalyst. The waste gases are then deflected via a waste heat boiler to a stack and into the atmosphere. At the completion of this phase the catalyst bed will have regained the average datum temperature (between 1,600° F. and 1,700° F.).

Combustion oil and air are then automatically shut off, and the gas-making phase commences with make-oil being sprayed into the preheater, where it meets a predetermined quantity of superheated steam, admitted into, and passing forward from, the centre of the preheater. The steam and oil vapour travel through the catalyst bed and the gases formed then pass into the purification system.

During normal working, air is supplied to the set by one of two 80-h.p. Keith Blackman fan blowers (capable of being worked in tandem, each giving a pressure of 50 in. W.G.).

The oil rate is varied according to the quality of gas required, but the oil is circulated at a temperature of 200° F. It is drawn from one of two 20,000 gal. tanks, where the oil is kept warm by returning hot relief valve oil direct to the tank in use. Oil is supplied to the plant by one of two electrically driven Albany gear pumps.

The oil is pumped into the circulating system through a multi-tube steam heater where it attains the required temperature. It is essential to maintain this temperature with an oil of such high viscosity as, say, 950 seconds Redwood No. 1. The pressures at the burner or spray head depend on the burner or spray used as well as the quantity required, but are approximately 50 lb. per sq. in.

The combustion chamber is an empty vessel lined with high temperature refractory and well insulated. The preheater is lined with firebrick and is approximately two-thirds filled with firebrick checkers supported on a refractory arch. It is well insulated. The original preheater has been extended in both height and diameter to provide a greater area for vaporizing make-oil. At the same time the tangential entry to the catalyst vessel was replaced by a top central inlet which allows more even distribution over the catalyst bed.

The catalyst bed, approximately 22 in. thick, is situated approximately half way up the catalyst vessel. It lies on a layer of broken refractory supported by sole bricks laid on refractory arches. This vessel is also insulated and lined with firebrick.

The waste heat boiler, which takes all the waste gases, is of horizontal multi-tubular design.

Purification Plant

The oil gas passes through a purification train consisting of a washer scrubber, electro-detarrer, secondary scrubber, and a gas oil washer, where the two main impurities tar and naphthalene are removed. Water is sprayed into the washer scrubber where it meets the hot rising gases, condensing the bulk of the tar carried forward from the plant and removing some naphthalene. Without any further cooling the gas is then electro-detarred at approximately 140° F., and passed through a secondary scrubber packed with special wooden grids where the gas is cooled to a temperature approaching that of the atmosphere, and the naphthalene content is reduced to the saturation figure at the gas outlet temperature. The remaining naphthalene is then extracted with gas oil in the Multifilm brush washer.

The gas is then admixed with the main works coal gas stream, via a relief holder, at inlet exhauster. Removal of H_2S in the mixed stream takes place in oxide purifiers.

Tar, Naphthalene, and Water Treatment

Tar deposited in the washer scrubber and the detarrer discharges into a flume leading to a separator. The free water separates out leaving a tar emulsion which flows by gravity into a buffer storage tank. The emulsion contains from 15% to 40% water, the actual quantity depending on working conditions and whether surface active agents are in use.

The tar emulsion is heated by steam in three vertical tar boilers where some water separates out. The treated tar is then discharged into a storage tank from which it is pumped through internally steam traced pipes to rail tankers for despatch to the tar distillers.

Water/naphthalene mixture from the secondary scrubber enters a separator where the solid naphthalene settles out and is removed by hand.

All the water is pumped from the end of the tar separator, where it is joined by the water from the naphthalene separator, to a forced draught cooler. The cooled water is then recirculated around the purification plant. To keep any obnoxious contents of the water down to a reasonable minimum fresh water is continually added at a low rate (1,500 gal. per day) and an equivalent amount of 'fouled' water removed. The latter is used on the coal gas plant as feed to the static ammonia washers.

Working Results

To date, the performance of the plant has been satisfactory, as an efficiency of 60% compares very favourably with 65% obtained on the pilot plant at Cahors in France where a superior oil is available. Daily outputs of the plant have been obtained which are 75% in excess of the output originally specified. This is to some extent surprising, as experience has shown that the fuel oils obtainable in this country are not as suitable as those used in France, in that they contain cyclic compounds, whereas the French oils are 'straight run' and contain mostly paraffinic compounds. Cyclic compounds present greater difficulty in thermal cracking, and in these circumstances a lower thermal yield must be expected than when thermally cracking a 'straight run' oil.

It has been found that the use of a shorter cycle has enabled

* From a paper to a joint meeting of the Midland Junior Gas Association and the Wolverhampton and District Engineering Society, December 12, 1955.
† Stafford District, West Midlands Gas Board.

the output of the plant to be substantially increased. At the same time, due to the consequent lower quantity of make-oil used each cycle, the duty imposed on the checker bricks in the preheater is less severe and a smaller temperature swing is experienced throughout the plant.

Spraying make-oil directly on to the catalyst bed, which was the practice up to some six months ago, had many inherent difficulties. Much difficulty was experienced in obtaining an even distribution of the oil-steam mixture over the entire surface of the catalyst bed. Moreover, all the make-oil ash was deposited on the surface of the bed, where it became caked and eventually blocked the catalyst.

After certain modifications to the plant, the make-oil was sprayed on to the checker bricks in the pre-heater. This restricted the amount of oil ash which reached the catalyst, resulted in less carbon being deposited on the bed, and ensured a more intimate mixing of oil and steam, which passed over to the catalyst vessel as a vapour. In this manner, local hot spots were prevented which were probably responsible for the caking of the oil ash in the first instance.

Before the method of make-oil spraying was changed, a very viscous tar was obtained from the plant, containing a high proportion of free carbon. However, when oil was sprayed into the preheater instead of the catalyst vessel, the tar became less viscous and more manageable. The original difficulties experienced with tar emulsion were much reduced and a tar with a reasonable water content was obtained without the necessity of excessive heating, which was never quite satisfactory.

Present analyses of the gas produced differ very little from coal gas. Although the CO_2 content is somewhat higher, this is offset to some extent by a lower nitrogen figure. The specific gravity of the gas is higher, but not unreasonable at 0.55 compared with coal gas at, say, 0.49.

A reduction in CO_2 content of the gas has to some extent been obtained by the use of an oil purge. This consists of blowing the high CO_2 gas to atmosphere at the beginning of the make phase. It results in the emission of a little smoke at the stack, but insufficient to be offensive.

Improved make-oil spraying has shown a marked decrease in the sulphur content of the gas. Sulphuretted hydrogen is of the order 150-250 grains per 100 cu.ft. and organic sulphur 25-35 grains per 100 cu.ft., which may be compared with 600-700 grains per 100 cu.ft. and 20 grains per 100 cu.ft. respectively for coal gas. The shorter cycle has also assisted in the reduction of organic sulphur, the quantity of which was one of the most important criticisms of the process.

Conclusions

The plant has been in operation for about six months since the modification mentioned earlier, and results are so improved that no doubt these modifications will be embodied in all future production units. During this period no blocking of the catalyst has been encountered, which in itself justifies the modification. Before, it was necessary to shut down every two months to screen the catalyst to remove the collected ash and dust. Recently the catalyst was found to be in excellent condition following a period when 100 mill. cu.ft. had been made.

During the summer months the quantities of oil gas mixed with coal gas in the town stream were of the order 50%, with a maximum of 60%. No difficulties were experienced, and it is felt with some confidence that oil gas might be substituted for coal gas in the town stream.

The plant requires only one man to control it and there should be no need for additional labour on larger units. The assistance of a further man is desirable for four hours each day to assist with tar treatment, loading and cleaning generally.

When considering the advantages of this process, it must be borne in mind that the capital cost is lower than for coal gas plant, as there is no expensive handling of solid fuel. This, in some measure, offsets the slightly higher cost of oil gas, compared with coal gas, but this difference may become less if the price of coal continues to rise faster than that of oil.

THE FUTURE OF UNDERGROUND GASIFICATION

In a recent address to the Coal Industry Society on 'The Fuel Situation and What Science Is Doing About It,' Mr. K. T. Spencer, Chief Scientist of the Ministry of Fuel and Power, said that there were two broad ways in which we could win our coal resources more economically and in greater quantity than at present. One was to take the line of ever further improving the known techniques of mining—and he had indicated that a good deal of progress was being made in that direction. The other route was to find an entirely different method of winning the goodness of the coal without having to mine it at all. Such a method was by underground gasification, which had been under experimental investigation for the last six years in a partnership between the Ministry of Fuel and Power and the National Coal Board. Since 1949 some 50 separate trials of underground gasification had been made; 5,000 tons of coal had been gasified in that way from six different seams by three different methods. Those who were dealing with the matter had set themselves the task of exploiting by such methods types of coal deposits not economically exploitable either by deep-mining technique or by open-cast working. That, however, was an arbitrary objective and, so far as they could see at present, when the existing technique had been further developed there was no reason why it should be confined to coal measures within that tight specification. Some economic estimates had been made, and the indications were that underground gasification could produce gas on the site at about 2½d. per therm; and when it was remembered that power station coal cost nearly 1d. more than that per therm at the power stations in many districts, it was not a bad result from the experimental work. The conclusions were that the gas could be converted into electricity certainly no more expensively, and possibly rather more cheaply, than the conversion of the coal itself into electricity. The energy we might be able to get in future from our own coal by underground gasification could be compared with the coal we were now winning from open-cast workings. One remembered the scepticism with which open-cast mining was started, and it was only within the last few years that it had become a really economic activity.

TECHNOLOGY AWARDS

Sir David Eccles, Minister of Education, has announced the names of five members of the new National Council for awards in technology of which the chairman, the Rt. Hon. Lord Hives, Chairman and joint managing director of Rolls Royce Ltd., was appointed in July. The Council will hold its first meeting on December 19. The five members appointed by the Minister are: Sir Harold Roxbee Cox, Director of the Brush Group, and formerly Chief Scientist, Ministry of Fuel and Power. Sir Arnold Hall, Technical Director, Hawker Siddeley Group and formerly Director, Royal Aircraft Establishment, Farnborough. Dr. Willis Jackson, Director of Research and Education, Metropolitan Vickers Electrical Co., Ltd. Dr. Idris Jones, Director-General, Scientific Department, National Coal Board. Mr. E. L. Russell, Chief Education Officer, Birmingham. The Council is being constituted on the advice of the National Advisory Council on Education for Industry and Commerce. Its function will be to create and administer awards in technology which will have a national currency and will be available to students in technical colleges who successfully complete higher technological courses approved by the Council. These awards will be designed to provide at the first level an educational qualification comparable in standard to a university first degree. Appropriate post-graduate awards may be established later. The Council will be an independent self-governing body operating under a Deed of Trust and will consist of the five members appointed by the Minister of Education whose names are given above, and of three appointed from their members by each of two Boards of Studies.

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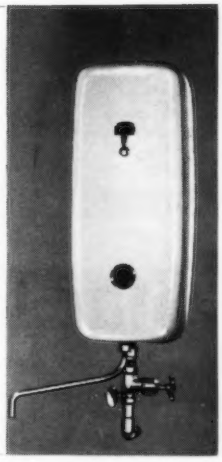

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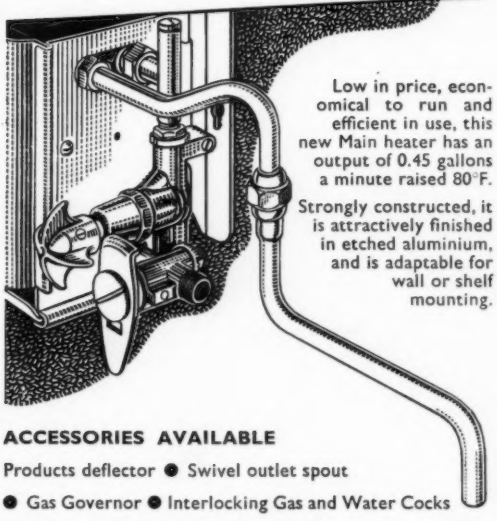

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Latest despatches confirm that over 36 miles of cast-iron gas and water mains (some 12 in. in diameter) were successfully descaled in this campaign.

" Liberated again " cried enthusiastic officials when normal services were resumed.

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*(*Mechanical and Chemical Engineer)*

Street scene at Enschede showing boring machine in action which can descale up to 350 yds. from one surface cut, at 50 yds. per hour.

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"Just another routine operation" commented General Descaling at his H.Q. yesterday. "Scale hasn't a chance when you call us in. With our weapons and tactics, we can rout out the most strongly entrenched deposits from Gas and Water Mains, Sewers and Culverts, at a fraction of the time and cost it would take to re-lay them. We operate safely, quickly and with a minimum of cutting and disturbance of services—leaving a finish as good as new.

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Meanwhile other units of General Descaling's forces are actively engaged throughout the world, wherever scale is to be found—in cast-iron, steel and earthenware pipes from 1½" to 36" in diameter. Anti-Scale assault troops are always ready to tackle YOUR scale problems at a moment's notice. If you need their assistance 'phone or write to-day. If you require further information it will be sent immediately.

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DOMESTIC COKE

Mr. J. Graham and Mr. E. W. Coley discussed difficulties in the way of the fuel's wider acceptance at a recent Manchester meeting

IN Manchester on December 9, at a joint meeting of the Manchester District Section, Institution of Gas Engineers, and the North Western Section of the Institute of Fuel an address and two papers were presented and discussed on the subject of domestic coke.

First came the address by Mr. J. Graham, Chief Sanitary Inspector of the Manchester Corporation, who said that in Manchester alone it was estimated that more than 16,000 tons of domestic smoke was emitted every year compared with about 7,000 tons of industrial smoke. The man in the street, however much he might be desirous of co-operating in achieving a clean air, would strongly resist any compulsion to pay for a solid smokeless fuel what he might consider to be an excessive price when compared with the price of coal. All publicity should be given to the proportionately greater increase in the price of gasmaking coals than in that of domestic coals and the necessarily greater cost of preparation of a suitable domestic coke over that of pre-war cokes, which were then regarded as a waste product of the gas industry. It was necessary to ensure regular, frequent deliveries of a consistently suitably graded coke with good ignitability and low ash content. A satisfactory coke with assured delivery at the required time was the only way to secure the goodwill of the domestic consumer.

The reference in Dr. Foxwell's paper to the 'Grancole' being made at Edinburgh had particularly interested him. If that could be retailed at only 6d. per cwt. over the price of normal gas coke and the user was not required to provide any special grate, it would be of tremendous value in the implementation of the clean air policy.

Dr. Foxwell's paper presented the provisions of the Clean Air Bill ('that will soon be in the Statute Book') as they affected the domestic fuel user. The domestic consumer in a smoke-control area would not be treated any more leniently than in the present smokeless zone. If the present appliances were to be retained the only solution would be to supply a fuel having properties similar to that of the low temperature coke now on the market. They generally have a C.A.B. value of 0.200-0.030. The Bill clearly envisaged, however, the replacement of traditional coal-burning open grates and kitchen ranges by modern appliances. The quality of the fuel, therefore, must be suitable for burning on those modern appliances—no better and no worse. The fuel technologist would like to see the closed stove become the general form of domestic heating by solid fuel on the ground that it is more catholic in its taste for the various qualities of coke, including oven coke, that are now upon the market and that it has a considerably higher thermal efficiency than the open fire. Some fuel technologists had been heard to declare that the country could not afford to continue to use the open fire in view of the need to economize in coal. However, the evidence put before the Beaver Committee, and repeated by many Members of Parliamnt during the debates on the Clean Air Bill, indicated that of the fuel used in replacing domestic bituminous coal not less than 80% must be in a form suitable for open fires. This proportion may well differ in different parts of the country and probably more coke will be used in closed appliances in London than in the North. Omitting London and some other parts of the country as special cases, it is fairly certain that most, and probably all, area boards must plant to produce large amounts of coke suitable for the modern coke-burning open grate.

The Effect of Local Option

There may be pressure, but there would be no compulsion on a town council to declare a smoke-control area, and undoubtedly there will have to be a popular demand for—or at least no very strong opposition to—such areas. It is expected that a Clean Air Council will be set up, inter alia, to ginger local authorities into action, and no doubt the National Smoke Abatement Society will continue to assist the movement with propaganda. But once a smoke-control area has been declared it is quite definite that there must be an adequate supply of suitable domestic fuel. If those who dwell in a smoke-control area do not find the fuel and the appliances with which they are supplied suitable, it is unlikely that the town council would be allowed by those who elect them to extend the area. It is thus of the utmost importance that the fuel and the appliances taken together should give a completely satisfactory service. It will be essential to establish an advisory service, no doubt run primarily by the gas industry and the fuel merchants in co-operation, to see that those who are brought within a smoke-control area are instructed and assisted in handling an unfamiliar solid fuel in an unfamiliar appliance.

The main point here made is that since a town council is an elected body, and strong opposition would develop to smoke-control areas if those who live in them find the combination of fuel and appliance unsatisfactory, the supply of fuel and particularly its burnability on the appliances provided must be considered from the national angle of what will be found satisfactory, and not from the point of view of what is most convenient to produce, in short of 'what can we get away with.'

This introduces a question that has not yet been answered. What should be the characteristics of the high-quality free-burning fuel indicated by the Beaver committee? At the Institution of Gas Engineers' Autumn Research Meeting several answers were given.

An important question in production will be that of the provision of coke from existing plant. It seems clear that a number of methods can be devised by which more coke could be made available from existing plant. All of these will involve a certain amount of additional cost.

Cost of Producing Free-burning Coke

So many factors enter into cost of production, factors that are often peculiar to a district, that it would be injudicious to dogmatise here. Some general observations may provide discussion, however.

Dealing first with the carbonization of lower-rank coals: The availability of the coal will be the first factor. Some gas boards have suitable coals in their area and indeed, as in Scotland, are wholly dependent on low-rank coals. Other Boards have only high-rank coals of the 400 and 500 groups and would have to pay considerable carriage on the lower-rank coals. This is pre-eminently a local problem. In general the possibility of blending will depend mainly on the availability at an economic cost of at least one constituent of the blend, and on the cost of the blending plant and its operation.

The price at pithead of the low-rank coals will be less than that of the higher-rank coals; Branson and Pickering mentioned a pithead price of high-rank coking coal of 88s. 1d. a ton for blending with Warwickshire coal costing only 72s. 1d. They arrived at the conclusion that if the use of Warwickshire coal were dictated by the need for increased coke production and all additional costs had to be borne by the coke over ½ in. in size, the saleable coke produced from 70:30 or 80:20 blends of coking : non-coking coal would need to realize 30s. a ton more than current prices. Probably there is not sufficient 700 group coal available; if there were, it would seem unnecessary for this area to blend 802 and 902 coals with other coals for the specific purpose of making a reactive coke; the coke produced

in the experiments from these low-rank coals had a C.A.B. value of about 0.03, which is comparable with that of true low-temperature cokes and suggests that the product would be suitable for existing coal-burning grates.

Traditional Preference for Coal

Mr. E. H. Coley of the Research and Development Department of Radiation Ltd., discussed and described briefly the progress that had been made in the application of coke to domestic heating services since the war.

A survey undertaken in 1952 and sponsored by the Coal Utilization Council indicated the limited extent to which coke has penetrated the domestic market. The results showed that coke, high and low temperature, contributed to the heating of the main living room in only about 18% of all homes and further for all applications coke was used in not more than one quarter of all homes. Militating against the more widespread adoption of coke are considerations such as the traditional preference for coal and the somewhat dubious reputation for quality gained by coke in certain parts of the country. Quality is of first importance in determining the public attitude towards coke as a domestic fuel. The ash content must not be too high and the moisture content should lie within certain limits. Successive deliveries to individual consumers should be consistent in respect of size, bulk density and combustibility. Failure to ensure reproducibility from consignment to consignment leads to irritation and frustration on the part of the user who is unable to establish precise operating techniques for his particular appliance.

The Simon Committee recognized that the considerable expansion advocated in the supply of solid smokeless fuels to the domestic market would necessitate the provision on a larger scale of appliances suitable for operation with these fuels. It accordingly recommended that (i) the production of improved multi-fuel appliances should be encouraged, (ii) minimum standards should be established for leading types of appliance, and (iii) the Government should be responsible for ensuring their proper testing according to type. The creation of an approval system was the direct outcome of these recommendations. The approval system has brought about a tremendous increase in the number and variety of solid fuel appliances made available to the domestic consumer.

Proportion of Modern Appliances

The 1952 C.U.C. survey showed that the proportion of homes having at least one modern appliance was about 18%. On this basis the total number installed must be well in excess of 2 mill. In 1952 the improved open fire alone was being produced at a rate of 1,700,000 per annum. The extent to which improved appliances are generally known to the public is, however, a little disappointing. The survey showed that knowledge of the inset fire was reasonably widespread, but appliances within the higher efficiency categories were less well-known. For instance of the housewives questioned only 18% knew of convector fires and furthermore this type of appliance had been installed in only 2% of homes. The provision of space heating to the main living room and domestic hot water supply are the most important heating services in the average house. The following review of appliance development is devoted primarily to living room appliances which provide either or both of these services.

(i) *The Inset Open Fire*

In the improved inset open fire particular attention has been given to the regulation of the combustion air supply. Means are provided for rigidly fixing and sealing the appliance in the fireplace opening and machined bedding surfaces for the combustion air control ensure that adventitious air leakage is reduced to a minimum. The front firebars are replaced by a refractory lining which reduces heat loss from the lower part of the fuel bed, facilitates ignition and precludes the uncontrolled entry of air to the lower levels of the fire. Fitted to a normal refractory fireback to provide heat substantially by radiation, the improved open fire has a thermal efficiency, measured under standard conditions of the test bench, ranging from about 37-40%, 37% being the minimum required to qualify for approval. (Comparable figures for coal are 28-30%, 28% securing approval.)

(ii) *The Convector Fire*

In a convector unit the fire is fitted to a self-contained casing which carries the refractory lining to the fuel bed. Heat transmitted through the back and sides of the casing, from both the fuel bed and the hot combustion products, warms air circulating through the convection space. This space is defined by the casing and either an outer jacket integral with the appliance or the walls of the structural opening in which the appliance is installed. A reduction in radiant efficiency is more than offset by the heat output in the form of warm air and the overall efficiency is of the order of 43%. The warm air may be used to supplement the radiation component or alternatively it may be ducted to first floor rooms.

(iii) *Back Boiler Appliances*

Both the inset and the convector fire may be fitted with back boiler to provide domestic hot water or to serve a limited radiator system. Boilers for use with the inset fire are now normally supplied as part of a self-contained unit, a practice which ensures not only that the boiler is correctly positioned with respect to the fire but also that the danger of air leakage into the boiler flue is reduced. Official approval will be given to boiler flue sets and open fires which in combination have been found to meet the required standards. These call for an overall efficiency of not less than 45%. High-powered boilers which will service a radiator system in addition to providing domestic hot water are a recent development. These boilers may be of the simple block or tubular type. A convector fire fitted with boiler has an overall efficiency, space heating plus hot water, of the order of 55-60%.

(iv) *Free-standing Convector Fires*

The production of a new type of fire, conceived by B.C.U.R.A., was accelerated by the Ridley Report. The fire is a free-standing unit, which is capable of being fitted to existing fire openings. It provides space heating by radiation and convection and incorporates an adjustable throat restrictor. The thermal efficiency is similar to that of the ordinary convector but its installation is less complicated.

The new free-standing fires work with chimney flows of the order of 2,500-3,000 cu.ft. per hr. Two models used in field tests recently conducted by B.C.U.R.A. were found to give a substantial saving in fuel consumption and a higher level of comfort compared with the ordinary inset fire. Restrictors are available for fitting to the chimney entry of a normal open fire, but because of the greater area of the fire opening the flow cannot be reduced much below 4,000 cu.ft. per hr.

(v) *Appliances for Recess Installation*

In his 1953 Melchett Lecture Dr. Harold Hartley advocated a recess form of installation. The production of free-standing fires designed for installation in a recess has been a logical development of the 'Stand-In' type fire described under section (iv). In seeking to apply the principles of this fire to a unit which would provide hot water in addition to space heating it has been decided that the difficulties associated with making boiler connections ruled out installation within an existng fireplace opening. A free-standing unit was therefore developed for recess installation. This is provided with a throat restrictor and also incorporates a down-draught firebox which gives a very substantial reduction in smoke emission when burning coal. A companion unit without boiler was developed at about the same time.

(vi) *Downdraught Open Fires*

In the downdraught firebox primary air enters the fuel bed through its exposed upper surface. Combustion products leave at bottom grate level and enter a vertical flue which is enclosed by boiler and/or convection heating surfaces. The burning rate is controlled by adjusting the chimney pull at the top of this flue. A second entry to the chimney, controlled by throat restrictor, is arranged in the normal position above the fire to vent combustion products not drawn downwards through the fuel bed. Thermal efficiencies for the free-standing convector fires burning coke downdraught are 46 and 65% for non-boiler and boiler models respectively.

(vii) *Openable Stoves*

The openable stove has a firebox formed within a self-contained cast iron jacket and is equipped with firedoors which

permit operation under 'closed' or 'open' fire conditions. There are four main categories—inset and free-standing, each with or without boiler. With firedoors open space heating is provided by radiation and convection. Heat output with the doors closed is mainly in the form of convection. In general there is no significant difference in the bench efficiencies under the two conditions of operation and the standard method of test does not indicate to what extent performance is modified by the type of installation, *i.e.*, whether inset or free-standing. Under closed fire conditions failure to give a higher efficiency could be attributed to the lack of heat transfer surface beyond the fuel bed. On the other hand data now being obtained in the Fuel Research Station Calorimeter Building suggests that the difference in efficiency under closed and open fire conditions is greater than had hitherto been suspected. To obtain approval the thermal efficiency burning coke must be not less than 40 and 55% for non-boiler and boiler models respectively and continuous burning for unattended periods of up to 10 hours with a fuel consumption not exceeding a stipulated value must be possible.

(viii) *Combination Grates*

A combination grate is a multi-duty appliance providing cooking and hotplate facilities in addition to a hot water service and space heating. They are found mainly in lower income group houses and are suitable for installation in a small living room or living room-cum-kitchen. The appliance is defined in terms of the oven position relative to the firebox and the main types are:—1. Side-oven; 2. Oven-over-fire; 3. Two Room back-to-back.

To obtain approval minimum requirements relating to hotplate area and oven volume must be met. Performance tests are designed to assess the quality of oven cooking and the effectiveness of the hotplate. Following a set operating schedule a stipulated daily fuel consumption of just over 30 lb. (38 lb. for back-to-back units) must not be exceeded and the total boiler output must not be less than 70,000 B.Th.U. Under open fire conditions burning coke, the radiant efficiency must not be less than 17%.

(ix) *Other Appliances*

Although normally installed in the kitchen a number of appliances may contribute to the heating of the main living room. The open or closed domestic hot water boiler may be used partly or wholly to provide central heating. Modern developments include the application of thermostatic control. The thermostat, which may control the area of the combustion air inlet, is normally of the graduated or variable type having its temperature-sensitive element located in the boiler close to the flow tapping. Thermostatic control improves the convenience in operation of the appliance and cuts out the fuel waste which results when the heating service is provided in excess of the desired level. Thermal efficiencies are of the order of 60-70% and ratings for the supply of domestic hot water and space heating range from 12,000-50,000 B.Th.U. per hr. The independent boiler is for use with smokeless fuels only.

During the last eight years appliances have been developed which provide thermostatically-controlled central heating in the form of ducted warm air. One of these incorporates a downdraught firebox in which coal can be burned virtually smokelessly and which is also suitable for operation with coke. Fan circulated air is warmed by passage over a sheet metal exchanger and is then delivered at low level to rooms requiring space heating. The thermal efficiency is of the order of 75-80% and the rated space heating output is 30,000 B.Th.U. per hr. In addition the unit gives a domestic hot water service using a method which is somewhat novel. The hot water storage cylinder is located within an insulated recess which also houses the firebox unit and heat exchanger, the fan and electrical controls. The cylinder is heated by warm air passing over its surface and by radiation from the heat exchanger and hot water at a reasonably constant temperature is provided. Under conditions when no space heating is required the hot water supply is maintained by controlling the temperature of the air surrounding the cylinder.

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*The Alnwick to Rothbury High Pressure Main**

MR. W. SUTCLIFFE emphasized that consideration had been given to alternative methods of supplying Rothbury, including the use of special containers to carry compressed coal gas by road, and a butane/air plant at Rothbury. After careful consideration, none of these had proved to be as satisfactory as the method decided upon. He hoped that more information would be published as it became available, as he felt that this project gave a good opportunity to confirm the practical application of theoretical data on the flow of gas at high pressure in small diameter mains. He said he would have liked the authors to have given the degree of dehydration they expected to obtain by compressing gas to 100 lb. per sq. in., followed by after cooling, as this undoubtedly affected the layout of the main.

Mr. Garrett said that on the degree of dehydration when compressing gas to 100 lb. per sq. in. it should be remembered that this pressure is the normal maximum working pressure and that the cut-in pressure for the compressors may be 40 lb. per sq. in. or even lower. At 40 lb. per sq. in. the degree of dehydration is 64% representing a condensation of approximately 53 gal. per mill. cu.ft. At 100 lb. per sq. in. the respective figures are 85% and 72 gal. per mill. cu.ft. The main dust traps were situated at about 1½ mile intervals and were intended as dust traps but despite this it would have been very serious if over the years a small accumulation of water was trapped at the very low points of the main hence they were made capable of fulfilling the role of dust, moisture and test point traps. The four extra traps near Alnwick Works were added purely as a safety precaution against moisture deposits and were thus truly syphons.

Mr. J. E. McManus said that the internal protection of the main was carried out by red lead paint and he would like to know Mr. Garrett's thoughts on the destructive effects of welding, especially oxy-acetylene on the protective paint at the jointing points on the main. Had thought been given to the possibility of the paint melting and running to one point on the internal periphery thus creating a possible source of restriction? It was not clear from the paper whether the stakes used when 'snaking' the pipe were removed after back-filling or not. If left in position, would they defeat the object of the snaking? On the question of future policy in operating the compressors to the best advantage he suggested that the optimum condition would vary with seasonal output. Whereas with peak winter load it would be advisable to maintain as high a reserve of pressure (gas stock) at the Rothbury end of the system as possible, by 'setting up' the low level and high level cut-offs of the compressor control mechanism, there would not be the same necessity for such a gas stock reserve on the lighter seasonal loads. The compressors could, therefore, be run at a much lower average of pressure in the latter case with consequent lessening of wear and tear and economy in driving power.

Mr. Garrett said that with regard to the electric welding

* A report of the discussion on the paper by W. R. Garrett, A.M.I.C.E., M.Inst.Gas E., and E. L. Robson, B.Sc., Assoc.M.Inst.Gas E., which was published in 'Gas Journal' on December 14, 1955.

destroying the internal red lead coating, preliminary tests had indicated that this was not a serious matter. He agreed that at each oxy-acetylene weld every 75 yards the heat would locally destroy the red lead and it was hoped that the bulk of this was discharged on the occasions when the main was cleaned of any debris after each test. There was a possibility of a slight restriction at these particular points. The wooden stakes at each joint were left in the trench after backfilling and would not interfere with the ultimate snaking of the pipe.

Mr. G. E. Anderson asked what arrangements, if any, had been made to maintain continuous supplies to the district in the event of the high pressure receiver having to be put out of commission. This plant was presumably classified as a high pressure vessel under official regulations, and as such would have to be isolated for periodic inspections.

Mr. Garrett said that the ordinary water sealed gasholder was coupled to the district but due to leakage and its inadequate pressure (3 in. maximum) it had been isolated. There was only one high pressure storage vessel, but provision had been made for another immediately the load demands same. Testing regulations for high pressure receivers were different to ordinary gasholders, boilers and air receivers and internal inspection was only required after a period of 10 years. It was hoped that long before inspection was necessary the demand for gas in the Rothbury area would be sufficient to justify the installation of another high pressure storage vessel and hence the problem envisaged by Mr. Anderson should not arise.

Mr. R. S. Longhurst said that he was particularly interested in the paper as, in the Carlisle Division, there was at Alston a similar works to that at Rothbury which was actually 12 miles from a larger works at Haltwhistle. He was, however, most interested in the size of the main. Although the authors had endeavoured to justify the use of 1½ in. diameter pipe by quoting the increased capital cost, if 2 in. diameter was used he would point out that the £1,419 mentioned only represented an annual charge of some £120 and he felt that the sum should be more than repaid by the decrease in the running cost due to diminished horse power requirements. He asked if the authors could give the comparative running costs. He said he would be pleased to receive any comments on the possible use of flanged pipes and/or Ermeto couplings. Although this would increase the cost of the main, the use of mainlayers only instead of welders, and the necessary transport of their equipment should reduce cost of laying the main. It would also allow easy removal for clearing if necessary in the years to come. He could not agree with the costing of the gas pumped to Rothbury which was charged at net cost of coal. Such conditions might appertain at the moment if one completely ignored wear and tear of plant, but at some period of the year or in subsequent years it would be necessary to light up a bed of retorts and perhaps even employ an extra stoker because of the extra load. The gas must be charged at the price into holder if a correct balance sheet was to be made.

Mr. Garrett replied that the increased capital cost of £1,419 was only for increasing the size of the pipe from 1½ in. to 2 in. and did not take into account the hundred and one items involved had a 2 in. diameter pipe been adopted. The actual welding would have taken longer, the size of gang to handle the pipe would have been larger, in fact, every item would have cost more and the total difference in cost would probably have amounted to £3,000. The pressure drop along the line would have been reduced to about 9 lb. per sq. in. for a 2 in. main instead of the 40 lb. per sq. in. drop for a 1½ in. main but as it would still be necessary to compress to 100 lb. per sq. in. to obtain storage capacity in the high pressure receiver at Rothbury the smaller pressure drop associated with the larger pipe did not in this case play as important a part as in normal practice. Assuming a cut-in pressure of 50 lb. per sq. in. and a cut-off pressure of 100 lb. per sq. in. the calculated saving in electrical power for pumping 3 mill. cu.ft. of gas per annum amounted to the very small figure of 750 units which at 1½d. per unit was approximately £5. The present estimated yearly pumping cost for electrical power amounted to approximately £73. Flanged piping would have been more expensive compared with that adopted and because of the possibility of leaking joints would have been most undesirable for this scheme. Ermeto couplings were far too expensive as a jointing medium and could only be justified for testing. They cost 25s. each, and the rings which in this case were used at the rate of one per day cost 1s. 9d. each. The extra cost of the Ermeto couplings alone would have been in the region of £3,600. Only time would prove whether parts of the main would ever need to be removed for cleaning but it was felt that all possible steps had been taken to prevent any stoppage and that such action would not become necessary during the life time of the main. It was agreed that costing the gas pumped to Rothbury at net cost of coal was not normal procedure. However, it was felt in this case that the 3 mill. cu.ft. per annum supplied to Rothbury was very small compared with the total output of Alnwick Works and as the recent modernization of the retort house to machine charging meant no extra labour, it was therefore permissible to assume no extra charges apart from cost of coal.

Mr. R. J. K. Shepherd asked at which end of the scheme was metering carried out? If at the receiving end it would appear that any leakages on the pipeline from Alnwick to Rothbury would only be noted by extra pumping time of compressors. Was this considered satisfactory? What provision had been made at the receiving end to prevent the receiver from emptying itself back into the pipeline in the event of a fracture on this line? What safety precautions had been taken in the event of a governor failure to prevent the low pressure distribution system from a build-up in pressure? At what pressure did the safety provision operate?

Mr. Garrett replied that metering was carried out at Rothbury but it was possible to check leakage of the line by a small gasholder which could be isolated to feed the Alnwick compressor. It would certainly be very inaccurate to check the line leakage by the running time of the compressors and if it was really justified a meter should be installed at the Alnwick end. A periodic check for leakage on the pipeline could easily be carried out by isolating in turn each section of line between manholes. Any leakage on that section would soon become apparent by a drop in pressure. The pipe line was fitted with a non-return valve prior to entering into the pressure vessel to safeguard against fracture of the line. On the low pressure side there was a mercury seal set to blow at 12 in. W.G. safeguarding against failure of the governor.

Mr. H. A. Sisson said that in order to avoid overhead welding it might be possible to turn the end of the fixed 75 yard composite length of pipe through 180°, or at least 90°, well within the elastic limit. Both lengths of pipe might be held in a wishbone shape cramp, so that they would be kept in line and turned together during welding. He asked if any change in the calorific value of the gas had been noticed as a result of the compression.

Mr. Garrett said that they could not be sure that torsional twist of 180° on 75 yards of 1½ in. pipe was possible because it had not been tried. There was no doubt, however, that some such procedure on the above lines would have been possible and had it been thought of, overhead welding could have been avoided. Certainly it was a valuable suggestion for a future project. The main had only been in continuous use for a few days but careful tests would be made regarding any drop in calorific value due to compression.

Mr. K. E. Brown remarked that Mr. Garrett had given no comparative costs for the main versus continued production at Rothbury using the present plant. Could he give a brief resumé of the position relative to butane/air? He asked for more detail regarding the possible alternative materials. He said he would also like Mr. Garrett to give the figures relating to the pipe size and the economic pressure at Alnwick and also the possible increase in gas consumption at Rothbury. This scheme had highlighted the need for a trencher much smaller than now used—a machine that would cut trenches up to 3 ft. deep and up to 10 in. or 12 in. wide. Such a machine would be ideal for estate mains and also services, as well as small diameter high pressure mains through country areas, and he would like to have details of the small trencher which was tried. He thought it was unreliable to test against a valve and he would like to see a mains pressure tester used (suppressed zero type). He suggested that it was inadvisable to weld joints with air at 100 lb. behind a valve in the same line. When men were working adjacent to bare cables he not only switched off, he put the fuses in his pocket and he would not have

relied upon a closed valve which might be opened in error while a man was welding. A spade between flanges at the valve position would have provided a safe-guard. Inspection and wrapping of joints was most important and he asked if this work was done by the workmen themselves or a staff man and was a holiday detector used.

Mr. Garrett said that the annual losses at Rothbury were known and any increase in demand would necessitate additional labour and further loss until such labour could be employed to full advantage. They were faced with replacement of a gasholder and fairly heavy plant renewal costs and with heavy transport costs for the coal. Carbonization in stop end retorts was an expensive procedure and there was only one answer which was that a bulk supply of gas providing the capital cost was not excessive. Butane/air and bulk delivery of towns gas in pressure vessels were considered but the scheme adopted was the only one that appeared to fulfil all the necessary requirements of low capital cost, reliability of supply, *etc.* It was not claimed as a universal solution for the closing down of all small works but was definitely the best solution in this particular case.

When alternative materials from which to construct the pipe were considered it was the price that was the final criterion. The pipe size was the smallest that could have been adopted bearing in mind the storage cylinder at Rothbury. Had a higher pressure been adopted then the cost of storage would have been excessive and conversely a lower pressure would have meant a much larger container for the storage requirements. The possible increase in gas consumption was an unknown factor at Rothbury due to the poor gas service that had been available in the past. There was a good market for gas and with a good reliable supply the demand should be considerably increased in a very short period. He agreed that it was unreliable to test against a valve but they were testing against a lubricated plug cock and all test figures indicated satisfactory results. There appeared to be some confusion on the criticism of welding joints and having 100 lb. behind a valve. In this case the line had been isolated by a vented dust trap and a cock on each side. It was fully agreed that wrapping of the joints was important and the responsibility for inspection of this was fairly and squarely laid on the shoulders (in writing) of one staff man. A holiday detector was not used and it was agreed that this would have been an improvement providing it would have negotiated the socket joints.

Mr. B. Richardson said that liquid deposits had been recovered from the special moisture separator immediately after the compressor aftercoolers and from the first moisture trap. Samples of these were sent to him for examination but as the volumes submitted in each case were very small only a qualitative analysis could be carried out. The liquid from the moisture separator presented the appearance of a cream-like emulsion of oil and water. Separation was effected by treatment with light petroleum ether, a layer of yellowish-coloured oil then being obtained, superimposed on a layer of water in which brown flocculi were suspended. It was demonstrated that the ether-soluble portion consisted of lubricating oil together with traces of phenolic bodies and other aromatic compounds. No benzene, toluene, or xylene could be detected however. The flocculi in the water layer were comprised of iron oxide closely associated with traces of lubricating oil. The sample from the first moisture trap contained lubricating oil and water only.

Mr. Garrett said that the first moisture trap was situated just before the main left the works and crossed the A1. road, and was approximately 50 yards from the compressor. This particular sample was as clear as water with a small quantity of floating oil on top. In future they would endeavour to supply larger and better samples for analysis.

Mr. J. Foxton said that bearing in mind the very high pressures used on this system, the type of benzole plant installed was not to be recommended. With an active carbon plant the higher vapour pressure constituents were more easily removed, leaving the lower vapour pressure (high boiling point) constituents in the gas. These latter compounds were preferentially removed upon compression of the gas. With an oil-washing benzole plant, the high boiling point compounds were more easily washed from the gas. With the active carbon plant mentioned by the authors, frequent renewal of the carbon would probably be essential if thorough stripping of the gas was to be accomplished. However, an active carbon plant was certainly better than no benzole washing at all. Once the high-boiling compounds started to come out of the gas, removal of the lower-boiling compounds occurred by scrubbing. He was not sure if the whole of the gas from the manufacturing plant had to be treated in the same stream as the gas which was compressed to supply the high pressure line. The removal of the benzole would reduce the thermal output from the plant by anything up to 8%. The use of carburetted water gas for peak loads would also have its limitations.

Mr. B. Richardson said he was very doubtful if Mr. J. Foxton was correct in stating that an active carbon benzole plant was less efficient than a plant of the oil washing type. Experience certainly did not bear out this contention, and the plant referred to in the paper recovered up to 2.6 gal. of spirit per ton of coal carbonized. Tests on a further plant of this type had revealed recoveries of from 82 to 85% of the total light hydrocarbons present in the gas, which were higher than he had ever found on an oil-washing plant of normal design. The vapour pressure extracted by benzole vapour in coke-oven or retort gas was usually about 7.6 to 8.0 mm. equivalent to one-tenth saturation. Therefore, at atmosphere temperatures of say 50° F. to 65°. it would theoretically require to be compressed to 10 atmospheres or 150 lb. per sq. in. before separation of light oils took place. Actually these theoretical conditions were borne out in practice. The same effect could be produced if the gas were maintained at atmospheric pressure but were cooled to −20° C. Regarding the higher boiling hydrocarbons in benzole such as cumene, pneudocumene, mesitylene, and their like, these did not amount to, at most, 0.3 gal. per ton of coal carbonized while their vapour pressure was of the order of 0.5 to 0.6 mm. If a recovery of only half these bodies in the benzole plant was assumed, the residual vapour pressure would be about 0.3 mm. Since their saturation vapour pressures at 60° F. varied from about 7 mm. to 20 mm., compression of the gas to 7½ atmospheres was hardly likely to cause their precipitation to any appreciable amount, and thereby bring about removal of lower-boiling constituents in the manner suggested by Mr. Foxton.

Mr. Garrett said that all gas at present being used on Alnwick and Rothbury Districts was passed through the A.C. plant but arrangements were in hand whereby gas required by Rothbury will be taken from a gasholder supplied with stripped gas. The reason for this was to ensure an adequate supply of stripped gas when the carbon in the A.C. plant was being changed. A reduction in calorific value for the gas delivered to Rothbury was anticipated but as the gas was sold on the volume basis and the gas at Alnwick was 500 B.Th.U. any reduction at the moment was permissible. Alnwick works manufactured gas from horizontal retorts with producer gas dilution for maintaining a calorific value of 500 and hence the question of limitation of use of carburetted water gas did not arise.

GAS COUNCIL'S APPROVED APPLIANCES LIST REVISED

A revised list of gas appliances which have been tested and approved by the Gas Council has been prepared at the request of the Ministry of Fuel and Power. It is recommended that appliances for domestic use should be selected from this list. It includes only those appliances which were in production when it was compiled. There is necessarily a time lag between a manufacturer's ceasing production of an appliance and the exhausting of stocks of that appliance, so that there may be some appliances on sale which are not included in this list. There will also be some appliances on sale which have been approved since the list was published, but in no case will an appliance be sold by a Gas Board which has not been approved by the Gas Council. The Council recommends in the introductory notes to the list that adequate provision should be made for installation pipes to meet both immediate requirements and future developments. If at the time of building, capped or plugged points are left at positions where gas appliances may be installed in the future, the layout can be arranged so that as little as possible of the piping is visible, and the installation can be provided at the lowest cost.

COMPRESSORS & EXHAUSTERS FOR AIR AND GAS.

See our Advertisement Next Week.

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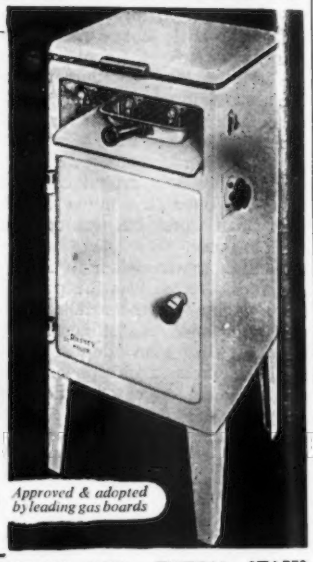
Especially suited to the kitchens of flats and small houses, these highly efficient cookers provide the utmost cooking capacity in the least possible space.

Their strength and durability reduces maintenance costs to a minimum, thus making them particularly suitable for hire purchase.



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Subscription Rates: Home and Empire:—**60/-** per annum; Foreign:—**70/-** per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at **2/-** per line (approx. **7** words)—minimum charge **10/-**. A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received **14** days prior to publication if proofs are required. Type area of inside pages **10** in. deep × **7** in. wide; block screen **120**.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* King's Norton 3868.

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, T.D., 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Fleet Street 2236-7.

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Name.....

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Post NOW to Nu-Swift Ltd. 25 Piccadilly W.1.

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(Director, B. T. King, A.I.M.E., Patent Agent) Advice, Handbook, and Consultations free. 146a, Queen Victoria Street, London, E.C.4. 'Phone: City 6161.

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

EASTERN GAS BOARD

IPSWICH DIVISION
DRAUGHTSMAN—CHELMSFORD GROUP

APPLICATIONS are invited for the position of DRAUGHTSMAN at the Chelmsford Group Headquarters.

The salary will be in Grade 6—Provincial ' A ' of the A.P.T. scales (£565/£645 per annum).

The successful candidate may be required to pass a medical examination and, unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment. Applications, stating age, qualifications and experience, should be addressed to the undersigned to reach him not later than January 31.

F. N. HOWES,
Group Manager.

Gas Works,
Chelmsford,
Essex.

January 3, 1956

EASTERN GAS BOARD

IPSWICH DIVISION
TECHNICAL ASSISTANT—IPSWICH WORKS

APPLICATIONS are invited from qualified men for the position of TECHNICAL ASSISTANT at the Ipswich Gas Works.

The successful applicant will be concerned chiefly with the day to day management and technical control of a section of plant at Ipswich Works, which has an output of about 8 mill. cu.ft. per day, at present.

The salary will be in Grade 9 (Provincial A of the A.P.T. scales) (£700/£800 per annum).

The successful candidate may be required to pass a medical examination and, unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the undersigned to reach him not later than Tuesday, January 31, 1956.

W. J. COLLINS GARRARD,
Divisional General Manager.

Crane Hill Lodge,
London Road,
Ipswich, Suffolk.

December 20, 1955.

EIRE

APPLICATIONS are invited for the position of RESIDENT MANAGER of a 25-30 mill. Works. Full particulars from G. Anderson, Ltd., 11, Merrion Square, Dublin.

WEST MIDLANDS GAS BOARD

INDUSTRIAL GAS OFFICER

APPLICATIONS are invited from suitably qualified persons for the above appointment, located in Birmingham.

Duties include the administration of the Board's Industrial Department and ability to control technical and development work relating to the use of gas in industry. The successful applicant will be required to co-ordinate the work of the Divisional Officers concerned with industrial gas. Administrative ability of a high order, in addition to a wide knowledge of fuel utilisation, will be expected.

The salary for the post will be £2,000 per annum.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, and giving the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him not later than January 23, 1956.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WORCESTERSHIRE AND HEREFORDSHIRE DIVISION
TECHNICAL ASSISTANT
HEREFORD DISTRICT

CANDIDATES should have received a good general training in Gas Manufacture, be capable of carrying out routine chemical tests and have experience in the control of plant.

The salary for the post will be within Grade 5 (£530-£610 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. C. F. W. Rendle, Divisional General Manager, West Midlands Gas Board, Newtown Road, Worcester, to reach him not later than January 20, 1956.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION
HOME SERVICE ADVISER

CANDIDATES should have had at least two years' training in Domestic Science and hold an appropriate Diploma or Certificate.

The salary will be within Grade 4 (£298-£450 per annum), or Grade 5 (£430-£494 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, and giving details of training and experience, together with the names of two referees, should be addressed to Mr. Stanley Jones, Divisional General Manager, West Midlands Gas Board, Kensington House, Bath Street, Dudley, to reach him not later than January 25, 1956.

J. C. INGRAM,
Secretary to the Board.

(*Classified advertisements continued on page* 114)

APPOINTMENTS VACANT (ctd.)

MANAGER, aged about 35, required for London Company dealing in piping equipment sold to gas and water undertakings. Applicants should have an engineering and manufacturing background and previous experience in management of a company. Sales experience in the U.K. and export markets also desirable. Reply with full details, education and experience. Apply: No. 271, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
WORKS SUPERINTENDENT—SCUNTHORPE

APPLICATIONS are invited from suitably qualified persons for the post of WORKS SUPERINTENDENT at Scunthorpe. The appointment will be made within Grades A.P.T. 8/9 (salary range £660/£800) and the commencing salary will be commensurate with the qualifications and ability of the person appointed.

Applicants should preferably hold the Higher National Certificate in Gas Engineering, have practical experience of a modern gasworks, with special reference to horizontal retort practice, and also have the ability to control labour.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications, giving details of age, education, training, qualifications and experience, together with the names of two referees should be addressed to reach the undersigned not later than January 28, 1956.

BERNARD CLARKE,
Divisional General Manager.

Belle Vue House,
Carline Road,
Lincoln.

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION

TECHNICAL ASSISTANT
GRIMESTHORPE WORKS, SHEFFIELD

APPLICATIONS are invited from suitably qualified persons for the vacant position of TECHNICAL ASSISTANT at Grimesthorpe Gasworks.

Applicants should preferably have had experience of Horizontal Retort Installations and Carburetted Water Gas Plants.

The salary for the position will be within Grade A.P.T. 6 of the National Salary Scales for Gas Staffs, ranging from £565 to £645 per annum, and the initial placing on the Scale will be in accordance with qualifications, experience and ability.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications, giving details of age, education, training, qualifications and experience, together with the names of two referees, should be addressed to reach the undersigned not later than Monday, January 23, 1956.

C. C. WOOD,
Divisional General Manager.

Commercial Street,
Sheffield, 1.

SWANSEA AND PONTARDULAIS UNDERTAKINGS

SALES AND SHOWROOM MANAGER

APPLICATIONS from suitably qualified persons are invited for the above position. The successful applicant will be responsible to the General Manager and Engineer for development of all gas and appliance sales; the direction of all showroom and district sales staff; preparation and submission of estimates for complete installations; the organisation and presentation of special exhibitions and displays; contract with planning, local housing and education authorities; co-ordination of district, showroom and home service work; liaison with architects, builders, and with the Undertaking's Distribution Engineer and Stores department in such a way as to secure maximum satisfactory service to consumers, and to control staff and displays at the small Morriston and Pontardulais Showrooms and the Undertaking's Agencies.

The position is one of responsibility with a rapidly developing undertaking in a coastal town, with continuously expanding industrial outer areas, a completely re-planned and re-built modern shopping centre, extensive residential areas and holiday bays within a few miles of the town.

Preference will be given to applicants with qualification in Gas Supply, supported by experience in Gas Utilisation and Showroom Management, or some similar appropriate qualification.

The salary will be within Scale A.P.T. 10 (Provincial A) (£760-£860).

Housing or Flat accommodation will be available at a reasonable rental.

Applications stating age, qualifications, education and experience, together with the names of two referees, should be forwarded to the undersigned within fourteen days of the date of the appearance of this advertisement.

A. PICKARD, M.INST.GAS E., M.I.I.A.,
General Manager and Engineer.

Gas Offices,
Oystermouth Road,
Swansea, Glam.

SCIENCE GRADUATE, preferably with experience in patent fuel production, and/or coal tar products, required to take charge of a research and development programme. Salary minimum £700 plus, according to experience, etc., pension scheme operable. Apply giving details of age, qualifications, previous experience, etc., to General Works Manager, Lancashire Tar Distillers, Ltd., P.O. Box No. 453, Manchester, 4.

SOUTHERN GAS BOARD

STATISTICIAN

APPLICATIONS are invited for the position of STATISTICIAN to the Board. His responsibility will be direct to the Board for all statistical work.

This is a new and pensionable appointment. The salary will be by arrangement with the successful candidate, but will be not less than £1,500 per annum. A professional qualification or University degree is essential, preferably both. Candidates should have had experience in the application of statistical methods to commercial problems and the design and interpretation of sampling procedures.

Applications must be on the form provided, which may be obtained from the Secretary of the Southern Gas Board, 164, Above Bar, Southampton, and returned to him within fourteen days.

SOUTHERN GAS BOARD

INTERNAL AUDITOR AND METHODS OFFICER

APPLICATIONS are invited for the position of INTERNAL AUDITOR and METHODS OFFICER to the Board.

This is a new and pensionable appointment. The successful applicant will be responsible to the Board for all internal audit work and the design of methods throughout the Board's area. At least one professional qualification is essential—some knowledge of electronic computers would be helpful.

The salary will be by arrangement with the successful candidate but will not be less than £2,000 per annum.

Applications must be on the form provided, which may be obtained from the Secretary of the Southern Gas Board, 164, Above Bar, Southampton, and returned to him within fourteen days.

SOUTHERN GAS BOARD

BOURNEMOUTH GAS UNDERTAKING

JUNIOR ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the position of JUNIOR ENGINEERING DRAUGHTSMAN (with workshop training) at the Pitwines Works of the Bournemouth Gas Undertaking.

The Salary will be in accordance with A.P.T. 2-3 (Provincial 'A') of the Salary Scales of the National Joint Council for Gas Staffs, i.e., £360-£535 per annum, according to qualifications and experience.

The successful candidate will be required to undergo a medical examination, and unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required to join the Board's Staff Pension Scheme.

Applications stating age, education, training and experience, together with the names of two referees, should be addressed to reach the undersigned not later than January 25, 1956.

J. C. HOGG,
General Manager.

Bournemouth Gas Undertaking,
136, Old Christchurch Road,
Bournemouth.

SOUTHERN GAS BOARD

ISLE OF WIGHT GROUP

SENIOR CHEMIST

APPLICATIONS are invited for the position of SENIOR CHEMIST at the new Central Gas Works at East Cowes.

Candidates should have had a comprehensive training and experience in all aspects of chemical control on Gas Works plant. It will be necessary for the successful candidate to prepare the laboratories and equipment in readiness for commencement of gas production at the new Works. A recognised qualification in chemistry would be an advantage.

The salary will be within the range of Grade A.P.T. 7 (£620-£700 per annum) of the National Salary Scales for Gas Staffs. The successful candidate will be required to pass a medical examination and, unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required to join the Board's Staff Pension Scheme.

Applications giving full details should be sent to the undersigned on or before January 28, 1956.

G. G. WARNE,
Engineer & General Manager.

Central Offices,
"Rosemount,"
Bellevue Road,
Ryde, I.o.W.

NORTHERN IRELAND

APPLICATIONS are invited for the p sition of RESIDENT MANAGER of a 25 mill. Work Thorough knowledge of Tully Plant, at l com tent salesmanship essential.

Full particulars from G. Anderson, Ltd., Merrion Square, Dublin.

R. & A. MAIN LIMITED invite applica ons fo graduates to fill the following positio s:—

(1) A CHEMIST, PHYSICIST, or C EMIC ENGINEER for research and develop ent o on Domestic Refrigerators.

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The positions offered are permanent and progres and for suitable applicants commencing salaries to £1,000 per annum are possible. Apply giving details as to age, experience, qualifications and pre salary to Personnel Manager, Messrs. R. & A. M Ltd., Gothic Works, Angel Road, Edmonton, N

QUALIFIED GAS ENGINEERS required by gressive company based London for service tially in the Middle East. Applicants must be porate members of the Institution of Gas Engine possessing wide experience in the organisation management of public gas supply undertakings. limit 45 years. Commencing salary commensu with qualifications and experience but not less £2,500 per annum whilst serving in the Compa consulting organisation overseas, plus a local allowance equivalent to £900 per annum. Furni married accommodation and medical attention vided free. Only engineers capable of holding Executive positions need apply. Replies giving details of career to date and present position salary should be addressed to No. 273, *Gas Jour* 11, Bolt Court, Fleet Street, London, E.C.4.

SCOTTISH GAS BOARD

NORTHERN DIVISION

APPOINTMENT OF MANAGER TO ELGIN DISTRICT

APPLICATIONS are invited for the position of MANAGER of the Elgin District Gas Un taking from qualified Gas Engineers experience modern Gas Works and distribution practice an the supervision and administration of a medium Undertaking.

The salary applicable to the post, which inc certain responsibilities for neighbouring Undertak in the Sub-Group, is £920-£1,045 per annum, free house and fuel allowance.

The successful candidate may be required to a medical examination.

Applications giving full particulars of age, qu cations and experience, together with *copies* of recent Testimonials, should be lodged with the u signed not later than Saturday, January 28, 19

H. S. MILNE,
Divisional Controller

50, Cotton Street,
Aberdeen.
January 4, 1956

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION

SHOWROOMS ASSISTANT—COVENTRY DISTRICT

CANDIDATES should have had sales experi and be accustomed to dealing with the publ The salary will be within Grade 4 (£365-£55 annum) of the National Salary Scales for Gas St The post is pensionable and the successful ca date may be required to pass a medical examina Applications, stating age, qualifications and ex ence, together with the names of two referees, sh be addressed to Mr. A. Allen, Divisional Ge Manager, West Midlands Gas Board, Gas St Coventry, to reach him not later than January 1956.

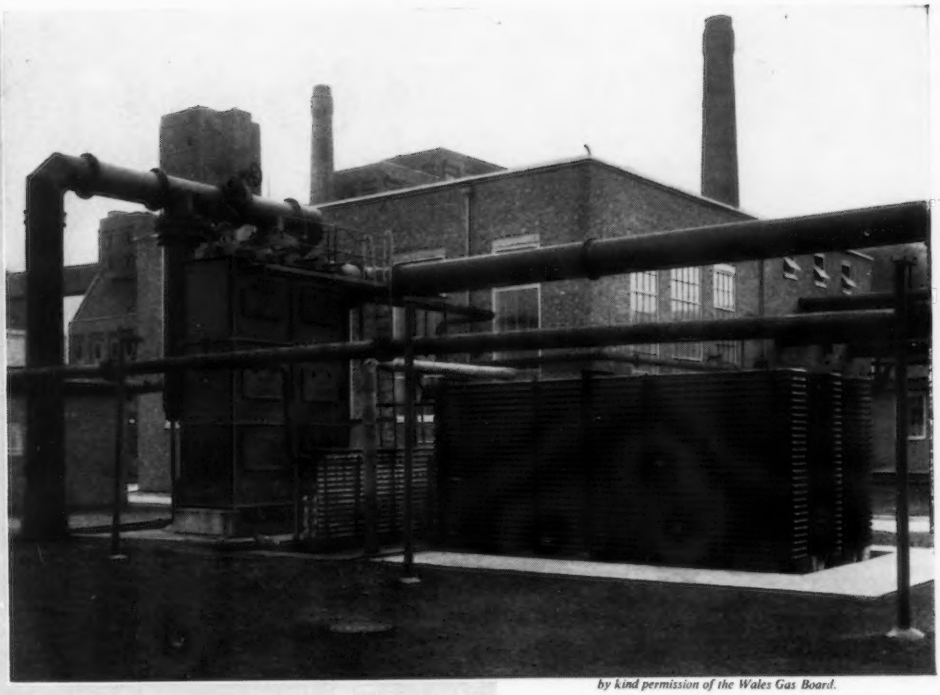
J. C. INGRAM,
Secretary to the Board

PLANT FOR SALE & WANTE

FOR SALE: NEW GAS-FIRED BOILER Hartley & Sugden. 160 lbs./hour at 80 lbs. p complete with chimney, spare burner and cont Original purchase price was £419. Our price £ W. H. COLLINGBOURNE & CO., LTD., Stratford Road, Birmingham, 28. Phone: Sp 3303.

WANTED: One second-hand MORRIS MAN SCOOP CHARGER complete with car framework in good working condition, suitable four beds of 8 'D' Section 10 ft. horizontal re (21" × 15").

Full particulars and price F.O.Q. Drog ed Secretary, Drogheda Corporation Gas Works, Dr heda, Republic of Ireland.



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Gas Dehydration by Holmes

Gas Dehydration Plant recently installed at Maelor Gas Works. Capacity 5,000,000 cu. ft. per day.

W. C. HOLMES & CO. LTD

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HOLMES
HUDDERSFIELD

Please write for publication No. 38/5

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TYPE 3 MIXTURE CONTROLLER

for accurate control of air blast systems

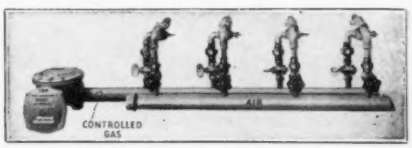
The Type 3 is the latest development in mixture controllers. Its function ensures exact proportioning of air and gas over a wide range of volumes despite the slightest variation of pressures.

Air pressures between ¼ lb. and 1 lb. are used normally but in special instances up to 2 lb. can be used.

Of robust unit construction, the assembly consists of a diaphragm valve monitor governor and an injector which can be set in any one of four standard positions on site.

The Type 3 mixture controller is available in four sizes 1", 1¼", 1½" and 2". Write or 'phone now for particulars.

The Type 3 zero governor is a modification of the controller. Providing individual control of burners, it gives greater effective control of heat distribution, facilitates burner ignition and has greater sensitivity and range than previous types.



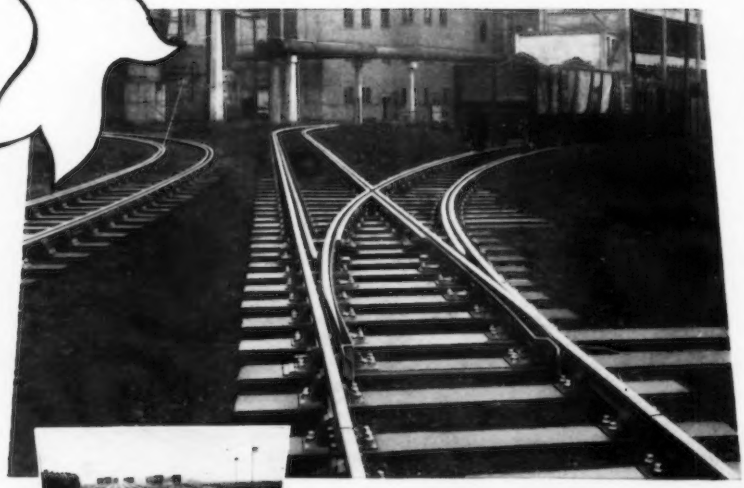
INDUSTRIAL GAS EQUIPMENT

Keith Blackman Ltd
MILL MEAD ROAD, LONDON, N.17
TEL: TOTTENHAM 4522 (12 LINES)

If air blast arrangements are not already installed a K.B. High Pressure fan will provide, as a rule, greater efficiency and economy than a positive blower or compressor of equal capacity. These fans may be supplied with or without K.B. made motors as required.

601

TRACKS FOR Mr. Therm



Litchurch Gas Works Sidings— carried out for the East Midlands Gas Board under the direction of A. W. Elliott, Esq., M.Inst.F. — were constructed by Grant, Lyon & Co., Ltd., in five months and comprise three miles of standard gauge track, using 95 lb. R.B.S. Bullhead material, and 21 turnouts. The layout consists of eight parallel tracks with one loop road and connects with the works across the old Derby Canal.

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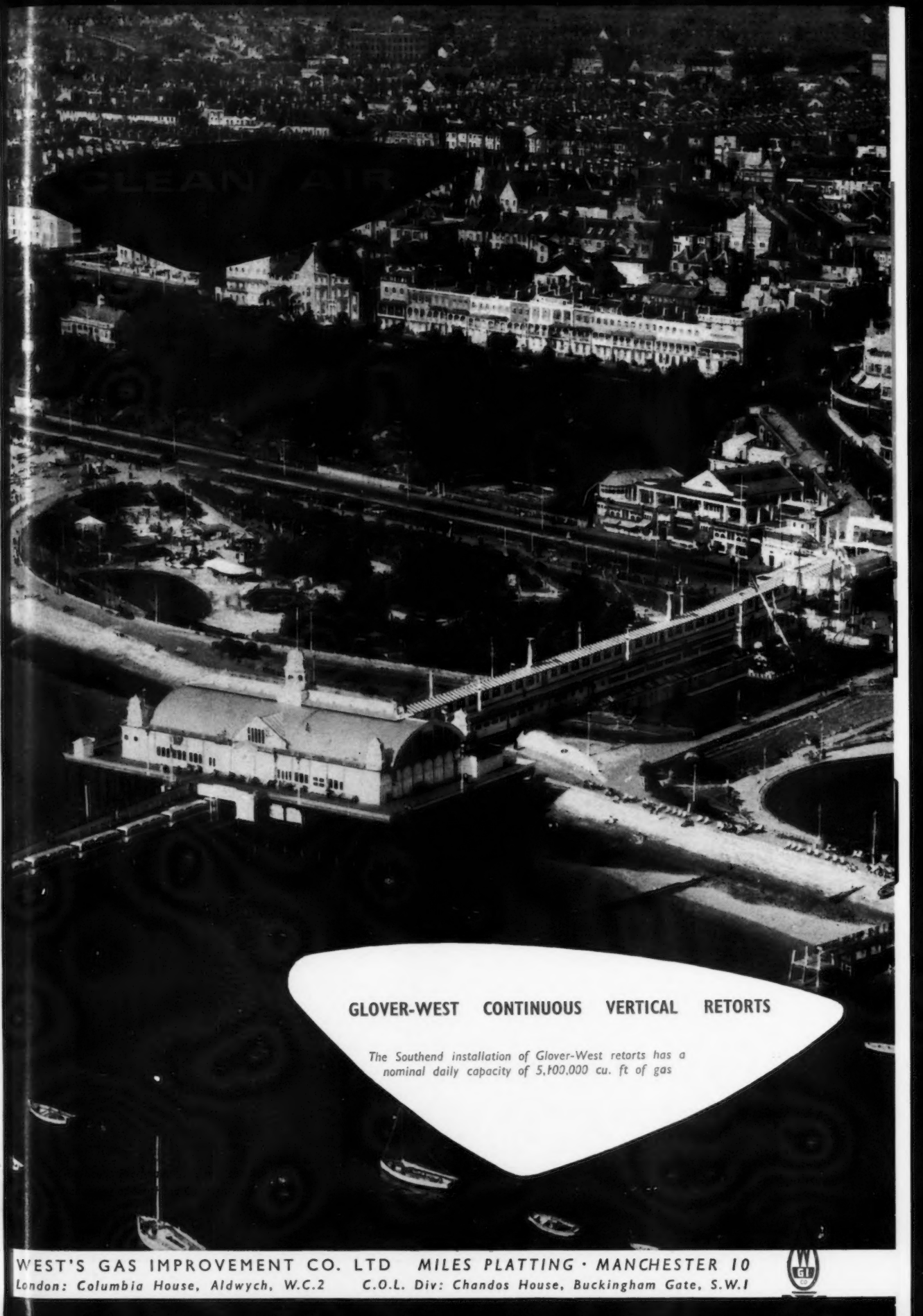

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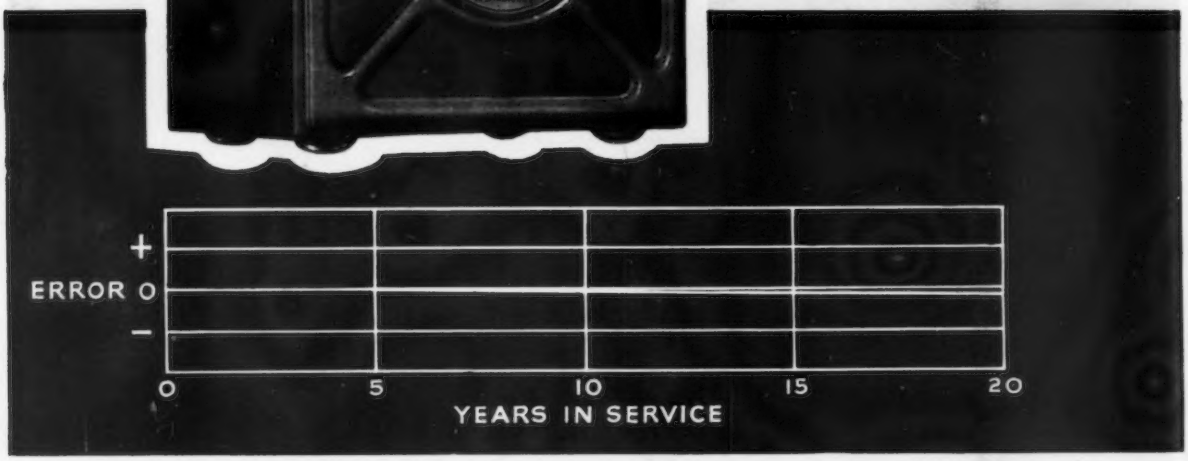

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